

Repair Manual

Jetta 2011 ➤

Jetta Hybrid 2013 ➤

Electrical System Hybrid

Edition 10.2020



List of Workshop Manual Repair Groups

Repair Group

93 - Electric Drive

Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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93 – Electric Drive

1 High-Voltage System Warnings

(Edition 10.2020)

K0059071821 - 09/30/2021

⇒ [S1.1 ystem Warnings", page 1](#)

⇒ [L1.2 abel", page 7](#)

1.1 High-Voltage System Warnings

Always check with the importer before performing any work on the hybrid system should there be any questions regarding the terms "technician trained in electrical systems", "high-voltage technician", "high-voltage expert" or hybrid systems.

Before beginning work on the high-voltage system, a high-voltage technician must disable the high-voltage system. Refer to ⇒ [page 6](#) and ⇒ [S8.3 ystem, De-Energizing", page 66](#).

For a list of work requiring the high-voltage system to be disabled. Refer to the list "Working on the High-Voltage System" and ⇒ [page 2](#).



WARNING

Read and follow the information below when de-energizing the high-voltage system to reduce the risk of fatal injury.

- ◆ *Only a qualified technician (high-voltage technician) should disable the high-voltage electrical system.*
- ◆ *The High-Voltage Technician (HVT) makes sure the system is de-energized and cannot be re-energized again.*
- ◆ *The high-voltage technician assures that the system cannot be re-energized again by safely storing the key, the High-Voltage System Maintenance Connector -TW- and the pilot line connector.*
- ◆ *The High-Voltage Technician (HVT) puts a sign on the vehicle saying the voltage is disabled.*
- ◆ *Only hybrid electrically instructed persons may perform all work (maintenance, tire changing, Convenience System) on vehicles with a high-voltage system. If there is any uncertainty, discuss with the responsible high-voltage technician.*
- ◆ *A high-voltage technician must disable the system before any work can be performed on the high-voltage electrical system or any other service work to the body.*
- ◆ *Only a High-Voltage Expert (HVE) may perform repairs to the vehicle if it is not possible to disable the high-voltage electrical system.*
- ◆ *Individuals with electrical medical equipment must not work on vehicles with a high-voltage electrical system. Examples of electrical medical equipment include pain medication pumps, implanted heart defibrillators, pacemakers, insulin pumps and hearing aids.*



WARNING

Working with high-voltage cables:

- ◆ *Do not support yourself or lay tools on the high-voltage cable or on any of its components.*
- ◆ *When working near high-voltage components and high-voltage cables, do not use tools that generate heat, that have sharp edges or that are used for cutting or shaping, such as welding, soldering, hot air or thermal adhesive equipment.*
- ◆ *When working near high-voltage components and high-voltage cables, do not use tools that generate heat such as welding, soldering, hot air or thermal adhesive equipment.*
- ◆ *Do not excessively bend or flex high-voltage cables.*
- ◆ *Always contact a High-Voltage Technician (HVT) if there are questions or if something is not clearly understood.*

Check the contact surfaces on the potential equalization cables before installation.

The contact surfaces must be clean. There must be no rust or grease on them.

Otherwise, clean the contact surfaces using the Contact Surface Cleaning Set -VAS6410-. Refer to ⇒ Electrical Equipment; Rep. Gr. 97; Contact Surfaces, Cleaning.

Follow all guidelines for clean working conditions.

Observe the following precautions when working on the high-voltage system:

- ◆ Only technicians who are trained in electrical systems should work on high-voltage vehicles.
- ◆ When working on a hybrid vehicle, always inspect the hybrid components in the area where the work is being performed.
- ◆ Do not excessively bend or flex high-voltage cables.
- ◆ Always contact a high-voltage technician or a high-voltage expert specializing in electrical systems if something is not understood or if there are questions.
- ◆ All the work described is referencing removing, installing and replacing the individual components.

Working on the High-Voltage System

During the Following Work	Minimum Qualifications
Disabling the high-voltage system	High-Voltage technician. Refer to ⇒ page 6
Restarting the High-Voltage Electrical System	High-Voltage technician. Refer to ⇒ page 6



When Working on the Following Components	Does a High-Voltage Technician Need to de-Energize the High-Voltage System Before Beginning Work?		Minimum Qualifications. Refer to ➤ page 6 .
	Yes	No	
Electric Drive Motor -V141-	X		Technician trained in electrical systems. Refer to ➤ page 6
Electric Drive Power and Control Electronics -JX1-	X		Technician trained in electrical systems. Refer to ➤ page 6
High-Voltage System Maintenance Connector -TW-		X	Technician trained in electrical systems. Refer to ➤ page 6
Electrical A/C Compressor High-Voltage Cable -P3-	X		Technician trained in electrical systems. Refer to ➤ page 6
Drive Motor High-Voltage Wiring Harness -PX2-	X		Technician trained in electrical systems. Refer to ➤ page 6
High-Voltage Wiring Harness for High-Voltage Battery -PX1-	X		Technician trained in electrical systems. Refer to ➤ page 6
Hybrid Battery Unit -AX1-, Removing and Installing	X		Technician trained in electrical systems. Refer to ➤ page 6
Charging the Hybrid-Battery -A38- with High-Voltage Battery Charger -VAS6565-	X		High-Voltage technician. Refer to ➤ page 6
Battery Regulation Control Module -J840-	X		High-Voltage Expert. Refer to ➤ page 6
Battery Fan 1 -V457-		X	Technician trained in electrical systems. Refer to ➤ page 6
Air ducts next to the Hybrid Battery Unit -AX1-		X	Technician trained in electrical systems. Refer to ➤ page 6
Air ducts under the Hybrid Battery Unit -AX1-	X		Technician trained in electrical systems. Refer to ➤ page 6
Electrical A/C Compressor -V470-	X		Technician trained in electrical systems. Refer to ➤ page 6
Drive Motor Temperature Sensor -G712-	X		Technician trained in electrical systems. Refer to ➤ page 6
Drive Motor Rotor Position Sensor 1 -G713-	X		Technician trained in electrical systems. Refer to ➤ page 6
Three-Phase Current Drive -VX54-	X		Technician trained in electrical systems. Refer to ➤ page 6
Electrical Drive Button -E656-		X	Technician trained in electrical systems. Refer to ➤ page 6
Fuse Electrical A/C Compressor -V470- in Electric Drive Power and Control Electronics -JX1-	X		Technician trained in electrical systems. Refer to ➤ page 6



When Working on the Following Components	Does a High-Voltage Technician Need to de-Energize the High-Voltage System Before Beginning Work?		Minimum Qualifications. Refer to ➤ page 6 .
	Yes	No	
Potential equalization cable (ground wires)	X		Technician trained in electrical systems. Refer to ➤ page 6
Working on the coolant circuit for the high-voltage components	X		Technician trained in electrical systems. Refer to ➤ page 6
Measuring insulation resistance	X		High-voltage technician. Refer to ➤ page 6
Working when the system is de-energized and the ignition is on	X		Technician trained in electrical systems. Refer to ➤ page 6

Conventional Work Near High-Voltage Components

When Working on the Following Components	The High-Voltage System Must Be Disabled By A High-Voltage Technician Prior To Beginning the Work?		Minimum Qualifications
	Yes	No	
Spark plugs		X	Technician trained in electrical systems. Refer to ➤ page 6
Catalytic converter		X	Technician trained in electrical systems. Refer to ➤ page 6
Exhaust system		X	Technician trained in electrical systems. Refer to ➤ page 6
Coolant reservoir		X	Technician trained in electrical systems. Refer to ➤ page 6
Front brakes		X	Technician trained in electrical systems. Refer to ➤ page 6
Decoupler	X		Technician trained in electrical systems. Refer to ➤ page 6
Internal combustion engine, removing and installing	X		Technician trained in electrical systems. Refer to ➤ page 6
Transmission without Electro-Drive Drive Motor -V141-, removing and installing	X		Technician trained in electrical systems. Refer to ➤ page 6
Fuel tank		X	Technician trained in electrical systems. Refer to ➤ page 6
Front subframe		X	Technician trained in electrical systems. Refer to ➤ page 6
Rear axle		X	Technician trained in electrical systems. Refer to ➤ page 6



When Working on the Following Components	The High-Voltage System Must Be Disabled By A High-Voltage Technician Prior To Beginning the Work?		Minimum Qualifications
	Yes	No	
Underbody trim		X	Technician trained in electrical systems. Refer to ⇒ page 6
Welding (cover high-voltage components with noncombustible materials and then perform a visual inspection)	X		Technician trained in electrical systems. Refer to ⇒ page 6
Vehicle body work (using an alignment bench)	X		Technician trained in electrical systems. Refer to ⇒ page 6
When working near high-voltage components and high-voltage cables, do not use tools that generate heat, that have sharp edges or that are used for cutting or shaping, such as welding, soldering, hot air or thermal adhesive equipment (Cover high-voltage components with noncombustible materials and then perform a visual inspection).	X		Technician trained in electrical systems. Refer to ⇒ page 6
Left Front Headlamp -MX1-, removing and installing		X	Technician trained in electrical systems. Refer to ⇒ page 6
Right Front Headlamp -MX2-, removing and installing		X	Technician trained in electrical systems. Refer to ⇒ page 6
Headlamp bulbs, removing and installing		X	Technician trained in electrical systems. Refer to ⇒ page 6

General Work

When Working On the Following Components	The High-Voltage System Must Be Disabled Prior To Beginning the Work?		Minimum Qualifications
	Yes	No	
12V Battery, removing and installing		X	Technician trained in electrical systems
General controls modules and electric components, 12V, removing and installing		X	Technician trained in electrical systems. Refer to ⇒ page 6
Fluids, coolant and fluids, draining and filling		X	Technician trained in electrical systems. Refer to ⇒ page 6
Refrigerant extracting, evacuating, filling		X	Technician trained in electrical systems. Refer to ⇒ page 6
Refrigerant pipes directly to the A/C compressor	X		Technician trained in electrical systems. Refer to ⇒ page 6
A/C System, flushing		X	Technician trained in electrical systems. Refer to ⇒ page 6
Peripheral refrigerant line (work that does not involve the A/C compressor directly without opening the opening the refrigerant circuit, for example, loosening and tightening the refrigerant line)		X	Technician trained in electrical systems. Refer to ⇒ page 6



When Working On the Following Components	The High-Voltage System Must Be Disabled Prior To Beginning the Work?		Minimum Qualifications
	Yes	No	
Work with the engine raised, engine mount	X		Technician trained in electrical systems. Refer to ➤ page 6
Emissions test		X	Technician trained in electrical systems. Refer to ➤ page 6
Follow the instructions in the paint handbook when performing any paint/drying work		X	Technician trained in electrical systems. Refer to ➤ page 6

Qualification Explanation

Qualification	Area of Application
Hybrid electrically instructed person	May perform general work and Maintenance services on the vehicle. May be requested by the high-voltage technician to perform mechanical work on the tension-free high-voltage system.
High-Voltage Technician (HVT)	The high-voltage technician has the same authorization as a technician trained in electrical systems due to his qualifications. The high-voltage technician can also: <ul style="list-style-type: none">◆ 1. De-energize the system◆ 2. Secure the system so that it cannot be energized again◆ 3. Ascertain that the system is definitely de-energized (certified measurement)◆ 4. Assign work on the high-voltage system to the hybrid electrically instructed person◆ 5 Put the vehicle back in operation.

Qualification	Area of Application
High-Voltage Expert (HVE)	A high-voltage expert is actually a high-voltage technician but with an extra qualification that allows them to disable the high-voltage system in the case that a high-voltage technician is not able to perform measurements with the standard tools and equipment. The high-voltage expert must continue the work if the high-voltage technician does not have the authority to work on the high-voltage system. The high-voltage expert is responsible exclusively to disable the high-voltage system if it cannot be disabled by the high-voltage technician using the usual means or methods.

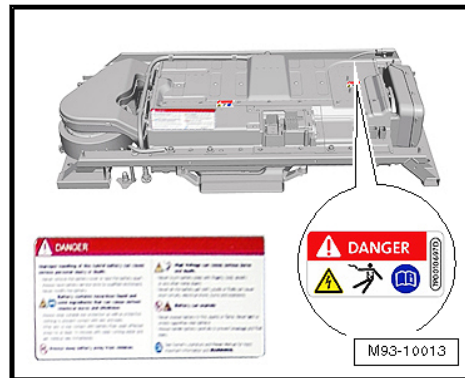
1.2 Warning Label

Every high-voltage component has a warning label on it.

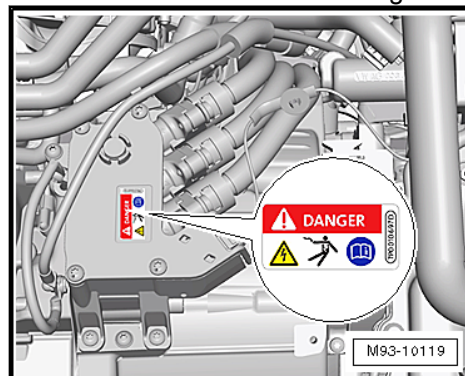
Be careful not to damage the warning label or to get it dirty when performing a maintenance service.

Warning labels on the following Repair Groups:

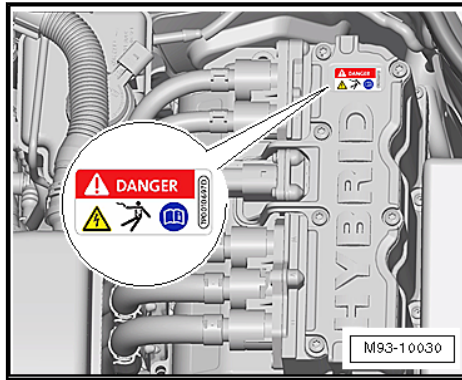
- ◆ The lock cross member has a yellow warning label.
- ◆ Hybrid Battery Unit -AX1- red warning label and battery warning label



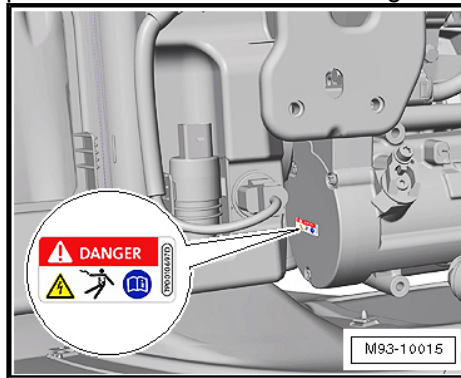
- ◆ Electro-Drive Drive Motor -V141- has a red warning label.



- ◆ Electric Drive Power And Control Electronics -JX1- has a red warning label.



- ◆ Electrical A/C Compressor -V470- has a red warning label.





2 High-Voltage Components

⇒ [-2.1 High-Voltage Components", page 9](#)

2.1 Overview - High-Voltage Components



1 - Electrical A/C Compressor -V470-

- ❑ Removing and installing. Refer to ➤ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor; Overview - A/C Compressor Power Unit

2 - 1.4L TSI Internal Combustion Engine

3 - Electric Drive Power and Control Electronics -JX1-

- ❑ Electrical Drive Control Module -J841-
- ❑ Voltage Converter - A19-
- ❑ Drive Motor Inverter - A37-
- ❑ Intermediate Circuit Capacitor 1 -C25-
- ❑ Electrical A/C Compressor -V470- fuse
- ❑ Removing and installing. Refer to ➤ [D5.3 Drive Output and Control Electronics, Removing and Installing](#), page 43

4 - High-Voltage Wiring Harness For High-Voltage Battery -PX1-

- ❑ Hybrid Battery High-Voltage Cable, Positive Terminal -P1-
- ❑ Hybrid Battery High-Voltage Cable, Negative Terminal -P2-
- ❑ Removing and installing. Refer to ➤ [B7.3 Battery High-Voltage Cable Set, Removing and Installing](#), page 55

5 - Battery Fan 1 -V457-

- ❑ Removing and installing. Refer to ➤ [F4.6 Fan, Removing and Installing](#), page 34

6 - Hybrid Battery Unit -AX1-

- ❑ Hybrid Battery Unit -AX1-, Removing and Installing. Refer to ➤ [B4.3 Battery, Removing and Installing](#), page 18
- ❑ Battery Regulation Control Module -J840-, Removing and Installing. Refer to ➤ [R4.4 Regulation Control Module, Removing and Installing](#), page 26 .

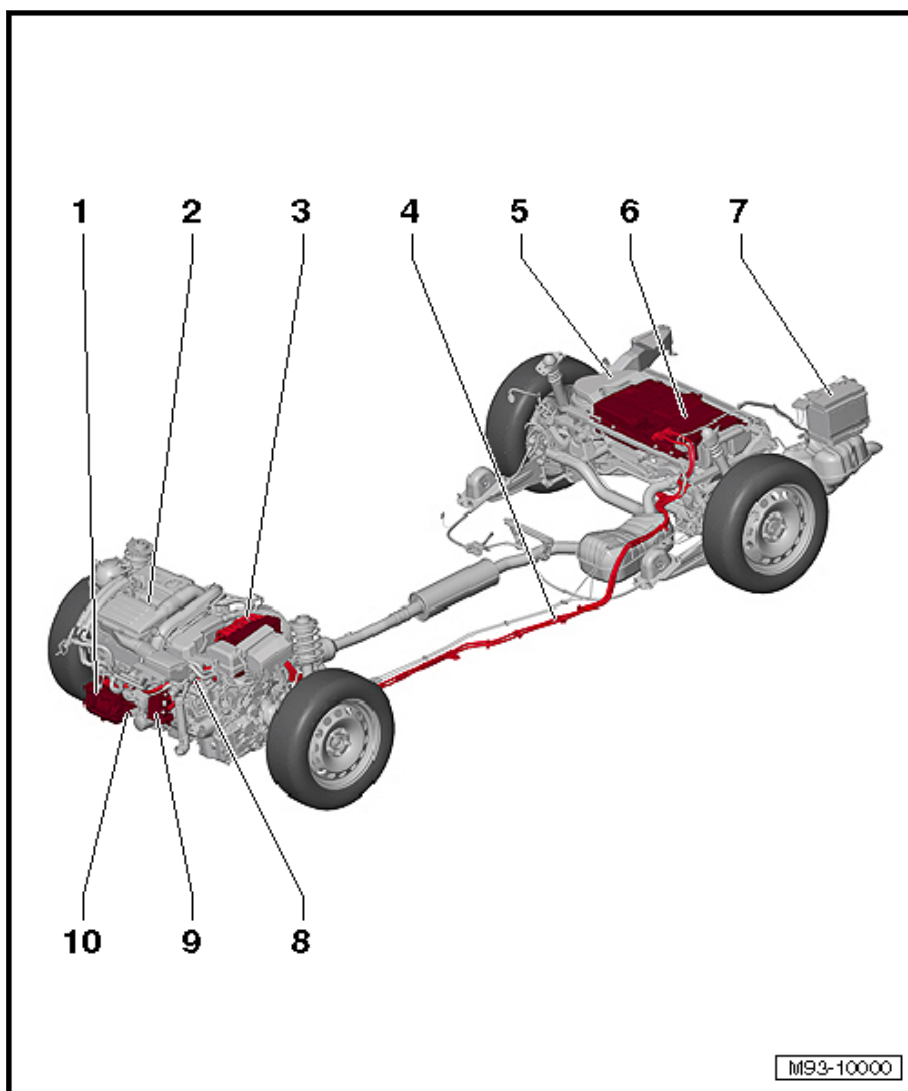
7 - 12 V Battery

8 - Drive Motor High-Voltage Wiring Harness -PX2-

- ❑ Drive Motor High-Voltage Cable 1 -P4-
- ❑ Drive Motor High-Voltage Cable 2 -P5-
- ❑ Drive Motor High-Voltage Cable 3 -P6-
- ❑ Removing and installing. Refer to ➤ [M7.4 Motor High-Voltage Wiring Harness, Removing and Installing](#), page 59

9 - Electro-Drive Drive Motor -V141-

- ❑ Removing and installing. Refer to ➤ [D6 Drive Motor](#), page 50





10 - Electric A/C Compressor High-Voltage Cable -P3-

- ❑ Removing and installing. Refer to [⇒ A7.5 /C Compressor High-Voltage Cable, Removing and Installing", page 62](#)

No Illustration:

- ◆ Cooling system for Hybrid Battery Unit - AX1-. Refer to [⇒ C8.1 ooling System, General Information", page 64](#) .
- ◆ Drive Motor Rotor Position Sensor 1 -G713-, removing and installing. Refer to [⇒ D6.2.2 rive Motor Rotor Position Sensor 1 G713, Removing and Installing", page 51](#) .
- ◆ Drive Motor Temperature Sensor -G712- installed in the Electro-Drive Drive Motor -V141-.



3 High-Voltage Technology Description

⇒ [V3.1 ehicle Driving", page 12](#)

⇒ [H3.2 igh-Voltage System Maintenance ConnectorTW ", page 13](#)

3.1 High-Voltage Vehicle Driving

⇒ [S3.1.1 tationary", page 12](#)

⇒ [M3.1.2 otor, Driving", page 12](#)

⇒ [t3.1.3 he Internal Combustion Engine and Electric Motor", page 13](#)

⇒ [R3.1.4 egenerating", page 13](#)

3.1.1 Remaining Stationary

Stationary with or without the Internal Combustion Engine Running

When the vehicle is stationary, the engine turns off automatically under normal conditions. However, the engine does not shut off if the battery charge or the coolant temperature is too low.

3.1.2 Electric Motor, Driving

Starting Off and Driving with a Low Load

At this point, the internal combustion engine is switched off and the Electro-Drive Drive Motor -V141-, which is powered by the Hybrid Battery -A38-, is driving the vehicle. This prevents the engine from working inefficiently. If the battery charge is below a specific level, the engine will start in order to charge the Hybrid Battery -A38-.

Driving Electrically (E-driving)

The function "Electric Drive" means driving using the Electro-Drive Drive Motor -V141- for as long as possible. The following can influence this:

- ◆ Battery charge (State of Charge (SOC))
- ◆ Speed
- ◆ Battery temperature
- ◆ Battery current capacity

Using the Electrical Drive Button -E656- in the center console switches to the E-drive pedal characteristic map. A message in the instrument cluster informs the driver when driving with the Electro-Drive Drive Motor -V141- is not possible.

Driving with the Electro-Drive Drive Motor -V141- will be deactivated when at least one of the following conditions occurs:

- ◆ The ignition is off
- ◆ Electrical Drive Button -E656- in the center console is pressed for the second time
- ◆ The selector lever position is in S.
- ◆ The selector lever is moved into the Tiptronic gate
- ◆ The speed is too high (> 60 km/h (37 mph))

To reactivate the electric drive, the Electrical Drive Button -E656- must be pushed.



3.1.3 Driving the Internal Combustion Engine and Electric Motor

Normal Driving

In “normal operation” the internal combustion engine drives the vehicle. The Electro-Drive Drive Motor -V141- works as a generator in that it charges the Hybrid Battery -A38- and provides power to the 12V vehicle electrical system. If the Hybrid Battery -A38- is charged sufficiently, the Electro-Drive Drive Motor -V141- can be switched on to drive the vehicle (boost).

Full Acceleration (boost)

For full acceleration, the vehicle is driven by both the internal combustion engine and the Electro-Drive Drive Motor -V141-. This occurs automatically under the following conditions:

- ◆ Kick-down in driving mode “D”
- ◆ Pressing the accelerator pedal all the way down when the selector lever position is in “S”
- ◆ Pressing the accelerator pedal all the way down when the selector lever is in the Tiptronic gate

Decelerating or Braking

Depending on the brake pedal travel, the Electro-Drive Drive Motor -V141- and/or the brake pedal slows down the vehicle. The Electro-Drive Drive Motor -V141- only slows down when the brake pedal is in its “idle” position. The wheels drive the Electro-Drive Drive Motor -V141-, which acts as a generator in this case and captures the energy. The Hybrid Battery -A38- stores the gained energy and uses it again later. If the brake “idle position” is exceeded, then both the Electro-Drive Drive Motor -V141- and the brakes are used to slow down the vehicle.

3.1.4 Power Regenerating

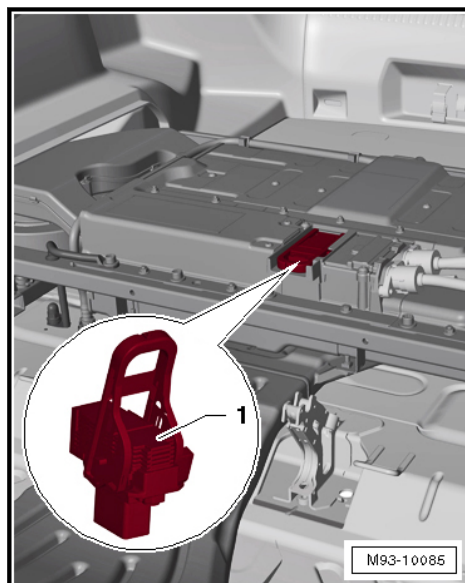
Regenerating

Regenerating means the energy from the moving wheels is recovered and regenerated into electrical energy. The recovered energy is used to brake the vehicle. Electric current is produced by the Electro-Drive Drive Motor -V141- working as a generator. This electricity is stored in the Hybrid Battery -A38- and supplies the accessories.

If the Hybrid Battery -A38- cannot store any more energy after a long recovery, the internal combustion engine starts and slows down the vehicle.

3.2 High-Voltage System Maintenance Connector -TW-

The High-Voltage System Maintenance Connector -TW- -1- is an electric bridge between both Hybrid Battery -A38- battery packs.



The residual voltage in the high-voltage system starts to decrease if the High-Voltage System Maintenance Connector - TW- is disconnected and/or the connection between the battery packs is interrupted. The high-voltage system is then de-energized.

The High-Voltage System Maintenance Connector -TW- must always be disconnected, if it is necessary to de-energize the high-voltage system. Refer to [⇒ S8.3 ystem, De-Energizing](#), [page 66](#) .



4 High Volt Battery

⇒ [B4.1 attery Pack, General Description", page 15](#)

⇒ [-4.2 High-Voltage Battery", page 15](#)

⇒ [B4.3 attery, Removing and Installing", page 18](#)

⇒ [R4.4 egulation Control Module, Removing and Installing", page 26](#)

⇒ [R4.5 egulation Control Module, Replacing", page 33](#)

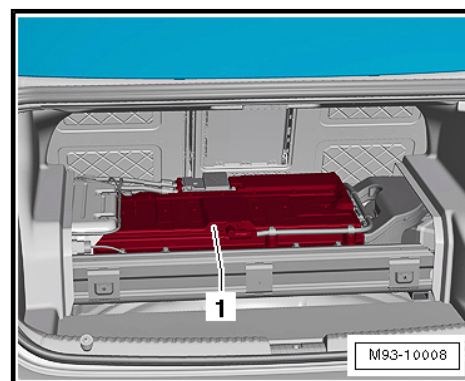
⇒ [F4.6 an, Removing and Installing", page 34](#)

⇒ [F4.7 an Air Guide Channel, Removing and Installing", page 35](#)

⇒ [B4.8 attery, Charging", page 39](#)

4.1 High-Voltage Battery Pack, General Description

The Hybrid Battery Unit -AX1- -1- supplies the Electric Drive Motor -V141- with the high voltage needed to drive the vehicle using only electricity.



The Hybrid Battery Unit -AX1- consists of the Hybrid Battery -A38- with 72 lithium ion cells and the Battery Regulation Control Module -J840-. The Hybrid Battery Unit -AX1- has a total voltage of 222 V. To protect the Hybrid Battery Unit -AX1-, especially during a rear collision, it is surrounded by a frame made of welded and bolted aluminum parts, which will deflect energy from the impact into the body frame. The frame is also used to lift the Hybrid Battery Unit -AX1- out of the vehicle using a Shop Crane -VAS6100- and a Holding Strap -T40155A-.

It is possible to remove and replace the Battery Fan 1 -V457-, the air ducts and the Battery Regulation Control Module -J840-. It is not possible to open or disassemble the Hybrid Battery -A38- itself.

Potential equalization cable on the Hybrid Battery Unit -AX1-. Refer to ⇒ [Fig. "Potential Equalization Cable on the Hybrid Battery Unit -AX1- -1-", page 64](#).

The Hybrid Battery Unit -AX1- can only be charged externally using the High-Voltage Battery Charger -VAS 6565A-.

If the Battery Regulation Control Module -J840- is replaced, then it is always necessary to perform the work procedure for replacing the Battery Regulation Control Module -J840- before removing it. Refer to ⇒ [R4.5 egulation Control Module, Replacing", page 33](#).

4.2 Overview - High-Voltage Battery

1 - Nut

- ☐ 5 Nm
- ☐ Quantity: 3

2 - Reinforcement

3 - Nut

- ☐ 5 Nm
- ☐ Quantity: 3

4 - Reinforcement

5 - Protective Cap

6 - Bolt

- ☐ 4 Nm
- ☐ Quantity: 3

7 - Cover

8 - Screw

- ☐ 4 Nm

9 - Bolt

- ☐ 10 Nm

10 - E-Box Housing

- ☐ Removing and installing. Refer to ➤ [H4.3.3 ybrid Battery Unit AX1, Retrofitting, Index D on Index C", page 25](#)

11 - Bolt

- ☐ 10 Nm
- ☐ Quantity: 4

12 - Exhaust Air Duct

13 - Screw

- ☐ 2 Nm
- ☐ Quantity: 2

14 - Bolt

- ☐ 4 Nm
- ☐ Quantity: 3

15 - Cover Plate

16 - Battery Fan 1 -V457-

- ☐ Removing and installing. Refer to ➤ [F4.6 an, Removing and Installing", page 34](#)

17 - Right Air Guide Duct

18 - Screw

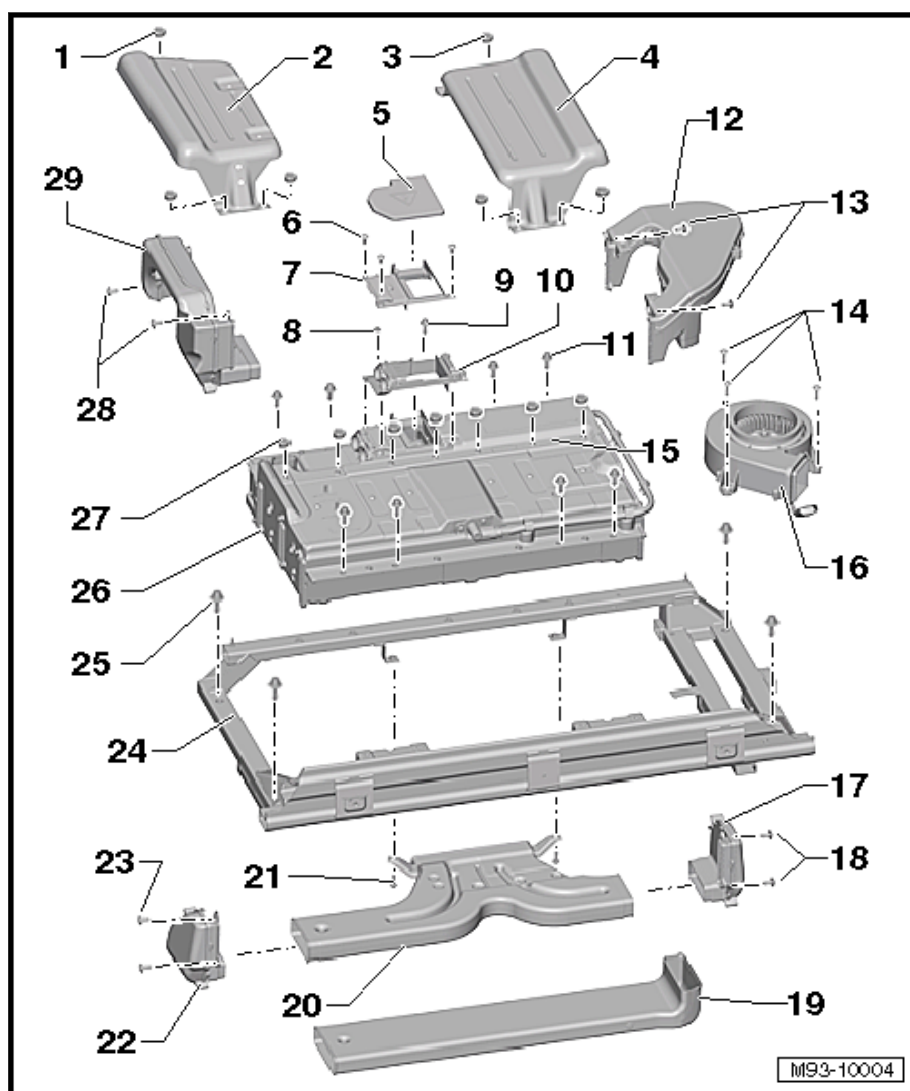
- ☐ 4 Nm
- ☐ Quantity: 2

19 - Air Guide Duct

20 - Lower Supply Air Duct

21 - Screw

- ☐ 4 Nm
- ☐ Quantity: 2



22 - Left Air Guide Duct

23 - Screw

- ☐ 4 Nm
- ☐ Quantity: 2

24 - Frame

25 - Bolt

- ☐ 55 Nm
- ☐ Quantity: 4

26 - Hybrid Battery Unit -AX1-

- ☐ Removing and installing. Refer to ➔ [B4.3 attery, Removing and Installing", page 18](#)

27 - Nut

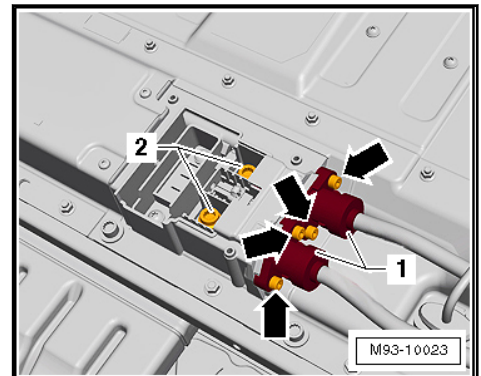
- ☐ 10 Nm
- ☐ Quantity: 11

28 - Screw

- ☐ 2 Nm
- ☐ Quantity: 2

29 - Exhaust Air Duct

Tightening Specifications, High-Voltage Contacts



- ◆ High-voltage contacts -2-: 20 Nm
 - ◆ Threaded connection -arrows-: 5 Nm
- If microencapsulated bolts -arrows- were used: replace.



4.3 High-Voltage Battery, Removing and Installing

⇒ [H4.3.1 ybrid Battery Unit AX1, Visual Inspection", page 18](#)

⇒ [H4.3.2 ybrid Battery Unit AX1, Removing and Installing", page 18](#)

⇒ [H4.3.3 ybrid Battery Unit AX1, Retrofitting, Index D on Index C", page 25](#)

4.3.1 Hybrid Battery Unit -AX1-, Visual Inspection



WARNING

Inspect the Hybrid Battery Unit -AX1- for:

- ◆ *Cracks in the battery housing or the battery case*
- ◆ *Deformations in the battery housing or battery case*
- ◆ *Changes in color due to effects of temperature and housing colors that have run*
- ◆ *Leaking electrolytes*
- ◆ *Damaged high-voltage contacts*
- ◆ *Legible and existing information labels*
- ◆ *Applicable potential equalization cable. Refer to ⇒ [E8.2 qualization Cables, General Information", page 64](#) .*

4.3.2 Hybrid Battery Unit -AX1-, Removing and Installing

Special tools and workshop equipment required

- ◆ Shop Crane -VAS6100-
- ◆ Torque Wrench 1331 5-50Nm -VAG1331-
- ◆ Retaining Strap -T40155- (quantity: 2)
- ◆ Sealing Caps - High-Voltage -T10506-
- ◆ Battery Supports -T10513-

Removing



WARNING

Read and follow the High-Voltage Electrical System General Warnings. Refer to ⇒ [S1 ystem Warnings", page 1](#) .



Caution

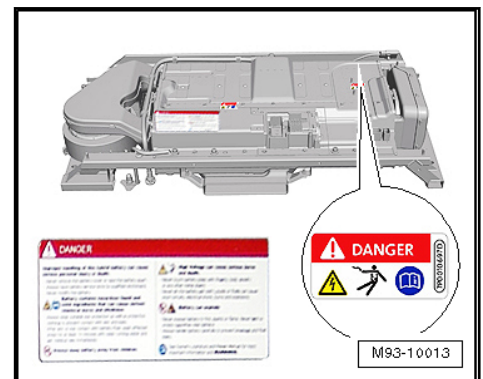
Pay attention to the instructions for handling high-voltage cables. Refer to ⇒ [C7.1 ables, General Description", page 53](#) .



WARNING

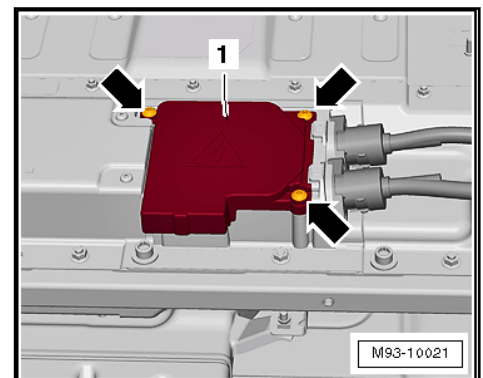
Hybrid vehicle high-voltage in the high-voltage system. Danger of electrocution! The following procedure requires working on the high-voltage system. Disable the high-voltage system now. Refer to ➔ [S8.3 system, De-Energizing](#), page 66.

- Park the vehicle on the hoist.
- Disable the high-voltage system. Refer to ➔ [S8.3 system, De-Energizing](#), page 66.
- Remove the rear bench seat. Refer to ➔ Body Interior; Rep. Gr. 72; Rear Seats.
- Remove the rear seat backrest. Refer to ➔ Body Interior; Rep. Gr. 72; Rear Seats.
- Remove the battery cover. Refer to ➔ Body Interior; Rep. Gr. 70; Luggage Compartment Trim Panels.
- Remove the luggage compartment floor. Refer to ➔ Body Interior; Rep. Gr. 70; Luggage Compartment Trim Panels.
- Remove the luggage compartment side trim panel. Refer to ➔ Body Interior; Rep. Gr. 70; Luggage Compartment Trim Panels.
- Be careful not to damage the red warning label and the battery warning label.

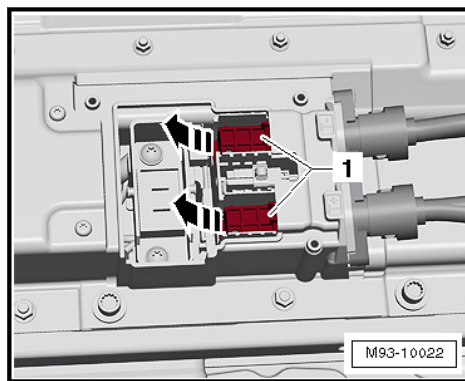


High-Voltage Wiring Harness For High-Voltage Battery -PX1- Removal

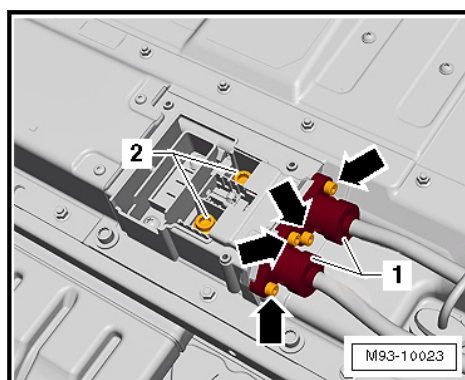
- Remove the bolts -arrows- on the cover -1- and then remove the cover -1-.



- Remove caps -1- from the high-voltage contacts in the direction of the -arrow-.



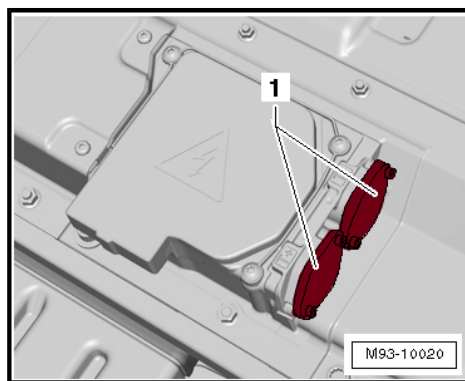
- Remove the bolts -2 and arrows- and carefully pull out the High-Voltage Wiring Harness For High-Voltage Battery -PX1- -1-.



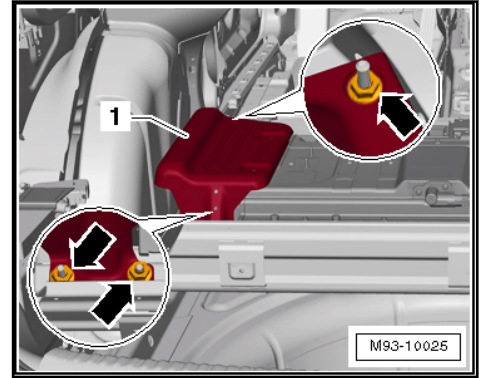
Note

Be careful not to damage the seals on the high-voltage cables.

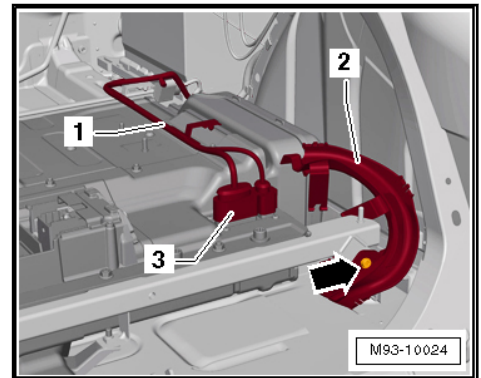
- Install the caps and the cover.
- Cover the High-Voltage Wiring Harness For High-Voltage Battery -PX1- with Sealing Caps - High-Voltage -T10506- (quantity: 2) -1-. Use the four bolts.



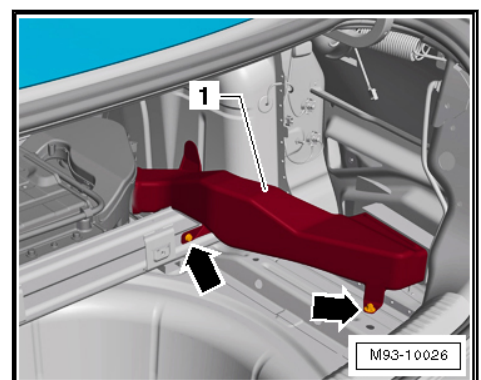
- Loosen the potential equalization cable on the Hybrid Battery Unit -AX1-. Refer to ➔ [Fig. “Potential Equalization Cable on the Hybrid Battery Unit -AX1- -1-”, page 64](#).
- Remove the nuts from the left and right reinforcements -1- -arrows- and then remove the reinforcements from the Hybrid Battery Unit -AX1-.



- Release the disconnect connectors -3-.

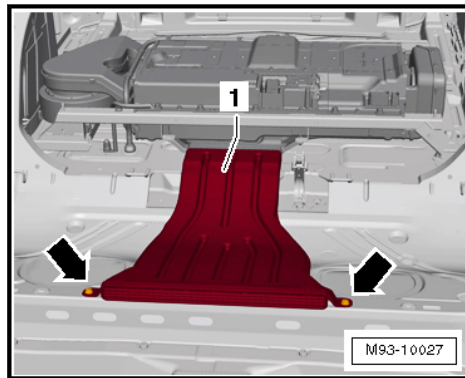


- Remove the bolt -arrow- from the high-voltage cable guide -2-.
- Unclip the high-voltage cable guide -2- and move it and the High-Voltage Wiring Harness For High-Voltage Battery -PX1- to the side.
- Unclip the cables -1- from the Hybrid Battery Unit -AX1- and set them to the rear.
- Remove the mounts -arrows- for the exhaust air duct -1- and then remove the duct.

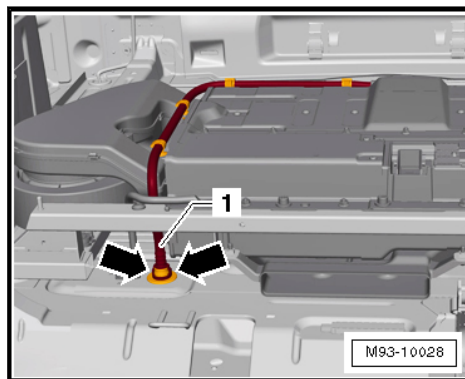


Be careful not to damage the foam seals on the air guide ducts when removing and installing the air guide ducts. Also, make sure the separating surfaces on the air guide ducts are completely sealed.

- Remove the mounts -arrows- on the air supply duct -1- and then remove the air supply duct -1- forward.

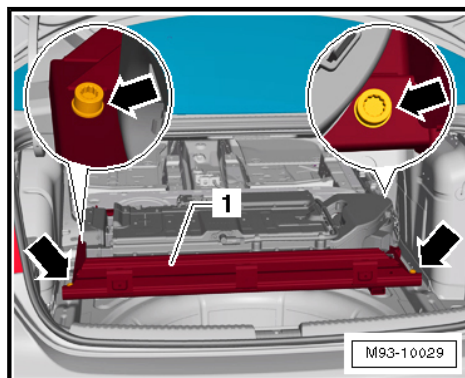


- Press the retainers -arrows- on the extraction air line -1- and remove it upward.



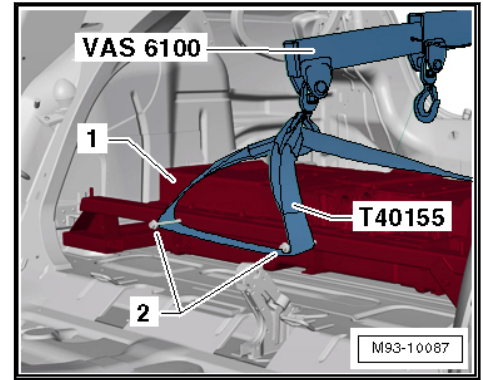
Removing the Hybrid Battery Unit -AX1-.

- Remove the four bolts -arrows- on the Hybrid Battery Unit -AX1- frame -1-.

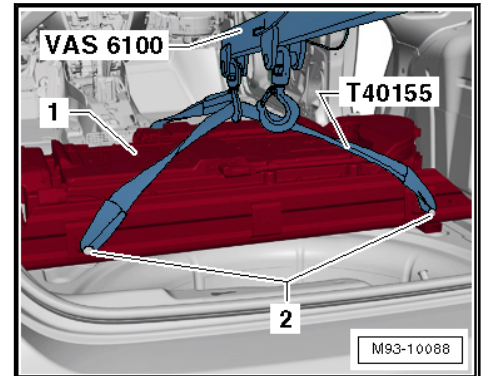


When removing, the Hybrid Battery Unit -AX1- must first be lifted up slightly and then moved in a longitudinal direction toward the left. Otherwise the Hybrid Battery Unit -AX1- does not fit through the opening in the luggage compartment.

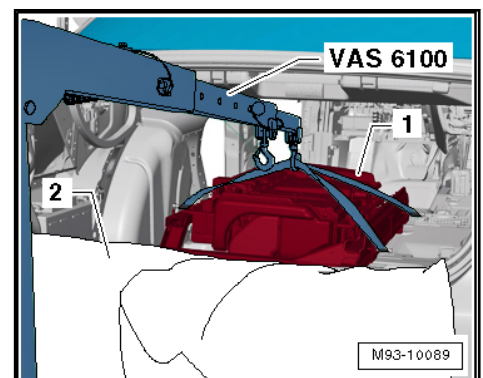
- It is necessary to raise the vehicle on the hoist so that the Shop Crane -VAS6100- can fit into the luggage compartment up to the Hybrid Battery Unit -AX1-.
- Install the two bolts (M6 x 50) -2- in the front crossmember for the Hybrid Battery Unit -AX1- -1- just far enough until it is possible to put the Retaining Strap -T40155- around them.



- Engage the Retaining Strap -T40155- in the Shop Crane -VAS6100-.
- Install the two bolts (M8 x 50) -2- in the rear crossmember for the Hybrid Battery Unit -AX1- -1- just far enough until it is possible to put the Retaining Strap -T40155- around them.



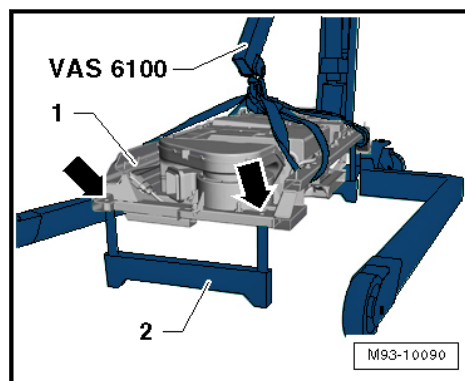
- Engage the Retaining Strap -T40155- in the Shop Crane -VAS6100-.
- Slightly lift the Hybrid Battery Unit -AX1- -1- in the center using the Retaining Straps -T40155- and the Shop Crane -VAS6100-.



Cover the rear bumper with a tarp -2-.

Be careful not to damage the air ducts.

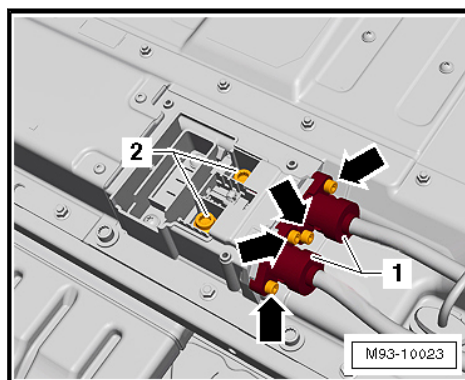
- Move the Hybrid Battery Unit -AX1- -1- to the left (approximately 90°) and lift it out with another technician stabilizing it.
- Place the Hybrid Battery Unit -AX1- -1- carefully on the Battery Supports -T10513- -2- and secure it with the four bolts of the Hybrid Battery Unit -AX1- -arrows-.



Installing

Install in reverse order of removal. Note the following:

- If microencapsulated bolts -arrows- were used: replace.



Be careful not to get any wires or connectors caught under the Hybrid Battery Unit -AX1- when installing the Hybrid Battery Unit -AX1- back into the vehicle.

Be careful not to damage the foam seals on the air guide ducts when removing and installing the air guide ducts. Also, make sure the separating surfaces on the air guide ducts are completely sealed.

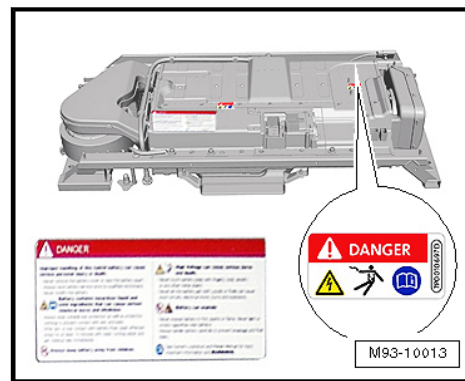
- Tighten the Hybrid Battery Unit -AX1- potential equalization cable. Refer to ➤ [Fig. "Potential Equalization Cable on the Hybrid Battery Unit -AX1- -1- ", page 64](#)

Check the contact surfaces on the potential equalization cable before installation.

The contact surfaces must be clean. There must be no rust or grease on them.

Otherwise, clean the contact surfaces using the Contact Surface Cleaning Set -VAS6410-. Refer to ➤ Electrical Equipment General Information; Rep. Gr. 97; Contact Surfaces, Cleaning.

- Make sure the red warning and the battery warning labels are there. Be careful not to damage them.



- Restart the high-voltage system and complete the required documentation. Refer to [S8.4 ystem, Re-Energizing](#), [page 66](#).

Tightening Specifications

- ◆ Refer to [-4.2 High-Voltage Battery](#), [page 15](#)

4.3.3 Hybrid Battery Unit -AX1-, Retrofitting, Index D on Index C

Hybrid Battery Units -AX1- 5C6.915.590.C are installed in USA Versions through 12/16/2012.

Hybrid Battery Units -AX1- 5C6.915.590.D are installed in all vehicles from 12/17/2012.

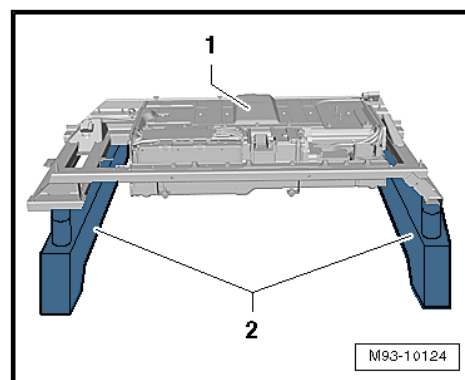
From 12/17/2012 the Hybrid Battery Unit -AX1- is replaced in vehicles with Hybrid Battery Units -AX1- 5C6.915.590.C. The new Hybrid Battery Unit -AX1- 5C6.915.590.D must be retrofitted on 5C6.915.590.C vehicles. There is a 5C6.998.015 conversion kit for this procedure. Refer to the Parts Catalog.

Procedure

- ◆ Check which Hybrid Battery Unit -AX1- is installed.
- ◆ Remove faulty Hybrid Battery Unit -AX1-. Refer to [H4.3.2 ybrid Battery Unit AX1, Removing and Installing](#), [page 18](#).
- ◆ Check if the new Hybrid Battery Unit -AX1- Index D is in the part number
- ◆ Installing conversion kit 5C6.998.015.

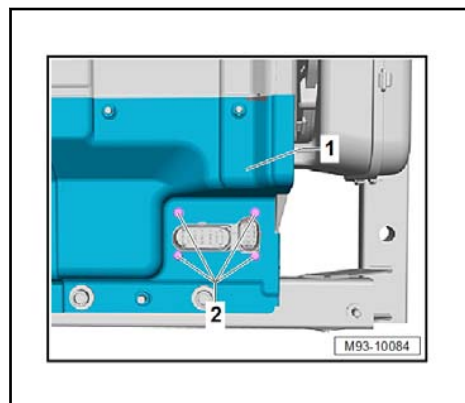
Installing Conversion Kit 5C6.998.015

Hybrid Battery Unit -AX1- -1- is placed on the Battery Supports -T10513- -2-.

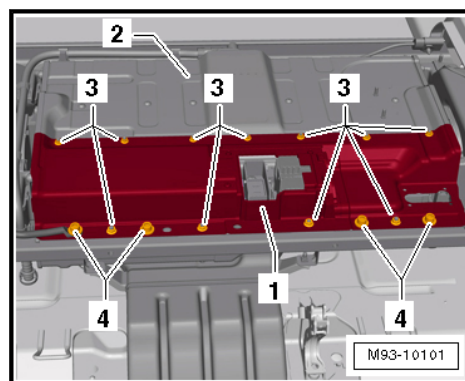




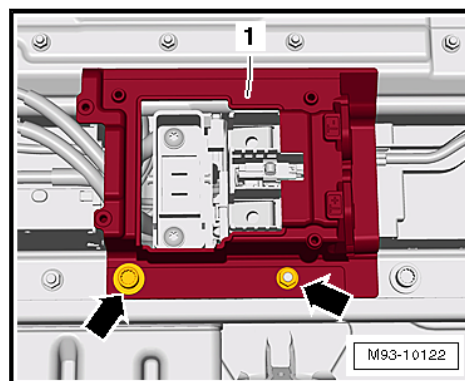
- Remove the cover over the high-voltage connections. Refer to ➤ [page 19](#) .
- Remove the bolts -2- for the cover -1-.



- Remove the bolts and nuts -3 and 4- from the cover -1- and then remove the cover -1- from the Hybrid Battery Unit -AX1- -2-.



- Remove the E-box housing -1-.



- Remove the bolts and nuts -arrows- and remove the E-box housing.
- Install the new parts from conversion kit 5C6.998.015.

Tightening Specifications

- ◆ Refer to ➤ [-4.2 High-Voltage Battery”, page 15](#)

4.4 Battery Regulation Control Module, Removing and Installing

The Battery Regulation Control Module -J840- is installed in the right front side of the Hybrid Battery Unit -AX1-.



WARNING

Pay attention to the general warnings for working on the high-voltage system. Refer to ➤ [S1 ystem Warnings](#), page 1.

- ◆ *This can pose health risks for people using electrical medical equipment.*
- ◆ *Risk of serious burns or death.*
- ◆ *Only a high-voltage expert may perform work on the Battery Regulation Control Module -J840-.*
- ◆ *Always use insulated tools when working on the Battery Regulation Control Module -J840-.*



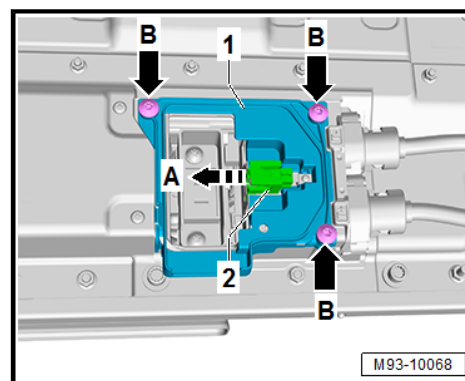
WARNING

High-voltage in the hybrid vehicle high-voltage system. Risk of electrocution! The following procedure requires working on the high-voltage system. De-energize the high-voltage system now. Refer to ➤ [S8.3 ystem, De-Energizing](#), page 66.

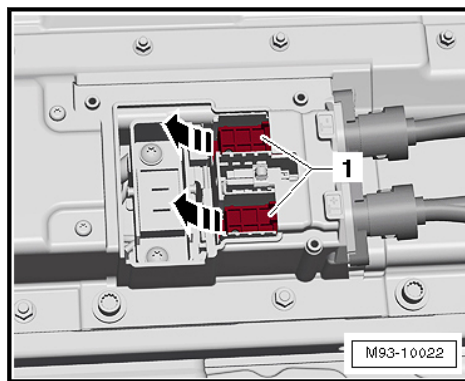
Removing

If the Battery Regulation Control Module -J840- is replaced, then it is always necessary to perform the work procedure for replacing the Battery Regulation Control Module -J840- before removing it. Refer to ➤ [R4.5 egulation Control Module, Replacing](#), page 33.

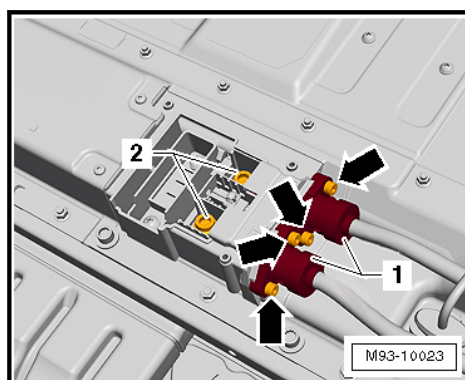
- De-energize the high-voltage system. Refer to ➤ [S8.3 ystem, De-Energizing](#), page 66.
- Push the connector -2- of the pilot line all the way in the direction of the -arrow A-.



- Remove the bolts -B arrows-.
- Remove the cover for the high-voltage connection -1-.
- Remove caps -1- from the high-voltage contacts in the direction of the -arrow-.



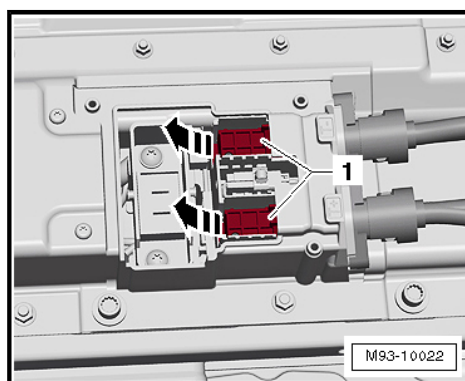
- Remove the bolts -2 and arrows- and carefully pull out the High-Voltage Wiring Harness for High-Voltage Battery -PX1- -1-.



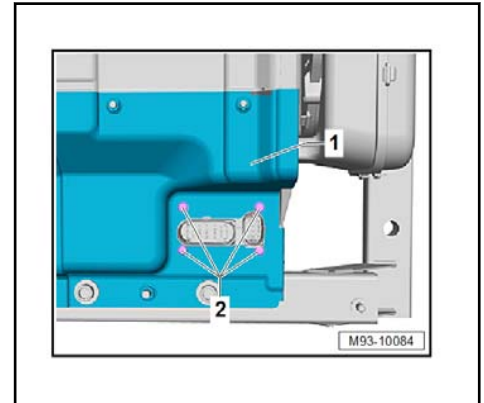
Note

Be careful not to damage the seals on the high-voltage cables.

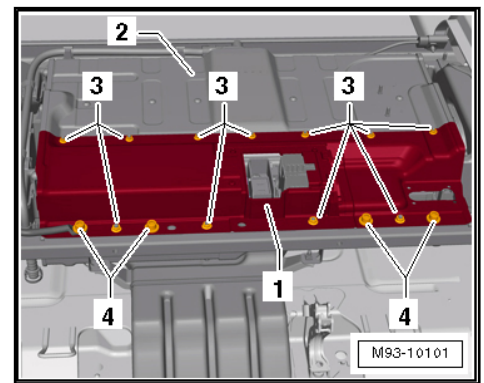
- Reinstall the protective caps -1- on the high-voltage contacts opposite the direction of the -arrows-.



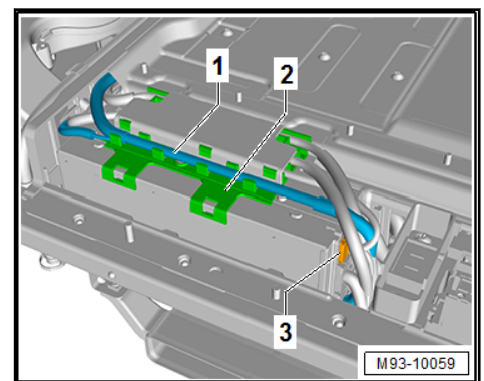
- Remove the bolts -2- for the cover -1-.



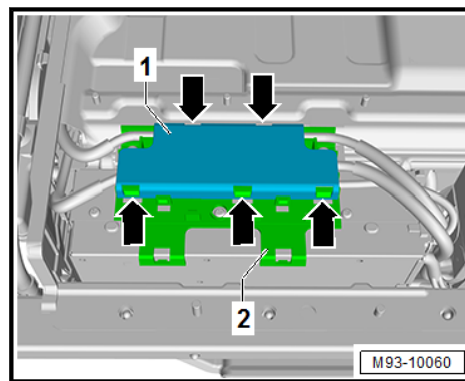
- Remove the bolts and nuts -3 and 4- from the cover -1- and then remove the cover -1- from the Hybrid Battery Unit -AX1-2-.



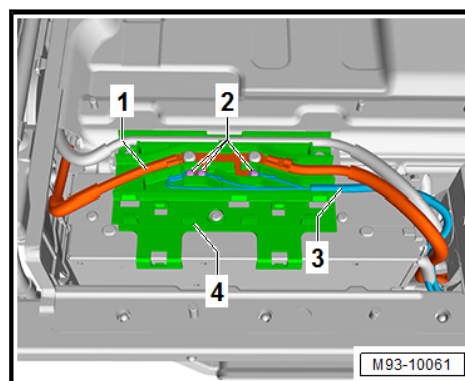
- Draw sketches or take pictures of the wires for the correct reinstallation.
- Unclip the wiring harness -1- from the bracket -2-.



- Release the connector -3- on the Battery Regulation Control Module -J840- and disconnect.
- Release the catches -arrows- on the contact protection -1-.



- Remove the contact protection -1- from the bracket -2-.

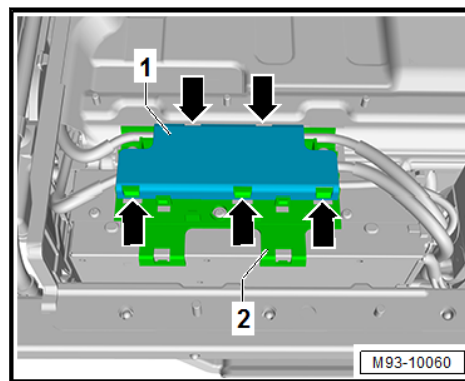


WARNING

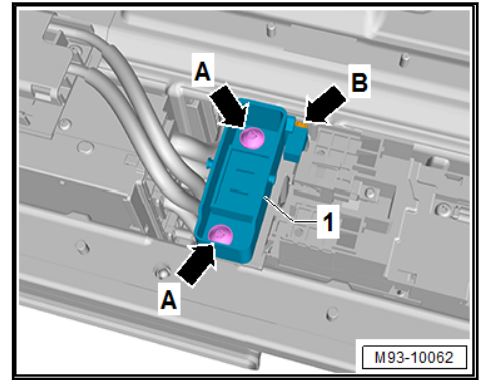
Check the potential equalization between the high-voltage cable -1- and the battery module housing.

There must be potential equalization between the high-voltage cable -1- and the battery module housing.

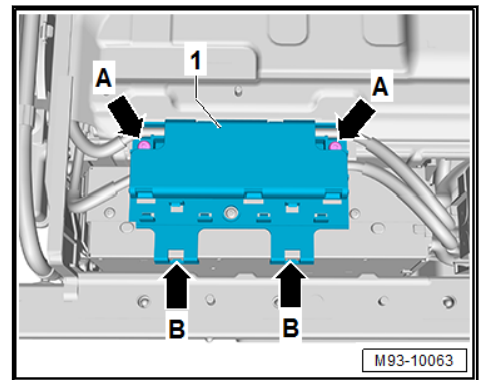
- Remove the three bolts -2- for the measuring cables -3- in the bracket -4-.
- Free up the wiring harness -3- to the side.
- Install the contact protection -1- back on the bracket -2-.



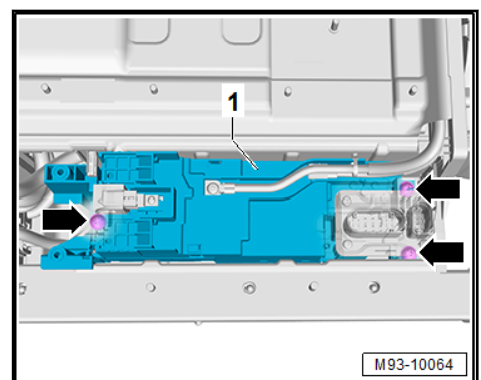
- Remove the bolts -A arrows-.



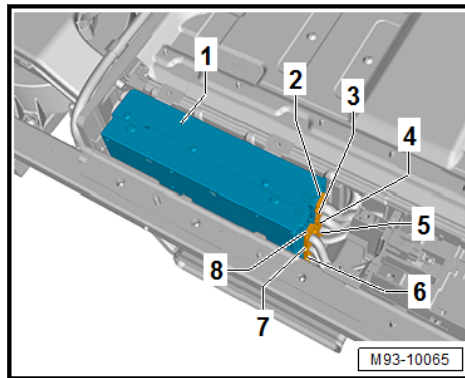
- Remove the High-Voltage System Maintenance Connector -TW- -1- mount slightly and at the same time release and disconnect the connector -arrow B-.
- Remove the bolts -A arrows-.



- Unclip the retainer -1- on the Battery Regulation Control Module -J840- -B arrows-.
- Pivot the retainer -1- together with the mount High-Voltage System Maintenance Connector -TW- to the side.
- Remove the bolts -arrows- on the high-voltage battery switch box -1-.



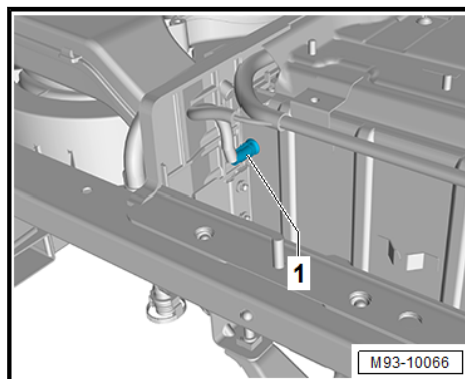
- Carefully lift the Battery Regulation Control Module -J840- -1- together with the high-voltage battery switch box.



- At the same time release the connectors -2- through -8- on the Battery Regulation Control Module -J840- -1- one after the other from above downward and disconnect.
- Remove the Battery Regulation Control Module -J840- -1-.

Installing

- Check the correct installation position of the temperature sensor -1- in the housing for the battery modules.



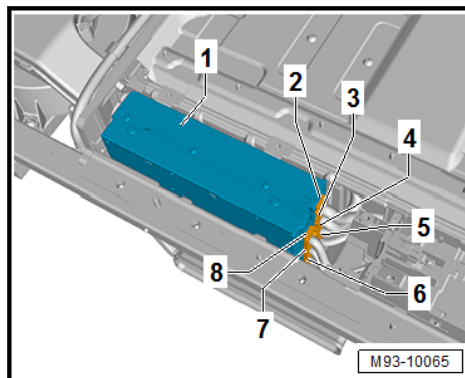
- If necessary position the temperature sensor -1- in the correct installation position.



Caution

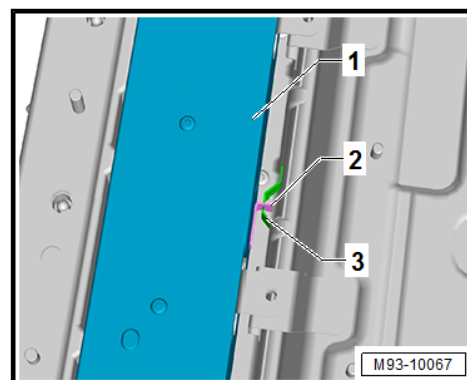
Reestablish the original wire routing according to the photos or sketches made during removal.

- When installing the Battery Regulation Control Module - J840- -1- first connect the lower connectors -5 and 6- .





- Then connect the rear connectors -2, 3 and 4- from below upward with the control module -1-.
- Then connect the front connectors -7 and 8- from below upward with the control module -1-.
- Insert the Battery Regulation Control Module -J840- -1- together with the high-voltage battery switch box in the battery housing.
- At the same time pay attention that the retaining tab -2- on the Battery Regulation Control Module - J840- -1- engages in the tab -3- on the battery module housing.



Further installation is the reverse order of removal.

- Re-energize the high-voltage system and complete the required documentation. Refer to [⇒ S8.4 ystem, Re-Energizing](#), page 66 .

Tightening Specifications

- ◆ Refer to [⇒ -4.2 High-Voltage Battery](#), page 15

Component	Tightening Specification
Resistor bracket to battery module housing	4 Nm
Measuring cable to resistor bracket	2 Nm
High-voltage battery switch box to battery housing	10 Nm
High-Voltage System Maintenance Connector -TW- mount to battery housing	10 Nm

4.5 Battery Regulation Control Module, Replacing

- Connect the Vehicle Diagnostic Tester .
- Select **Guided Functions**.
- Use the **GO TO** button to select the “function/component selection” and the following menu options one after the other:
 - ◆ Body
 - ◆ Electrical system
 - ◆ 01 - OBD
 - ◆ Hybrid battery management
 - ◆ Hybrid battery management functions
 - ◆ Battery Regulation Control Module, Replacing



4.6 Battery Fan, Removing and Installing

Special tools and workshop equipment required

- ◆ Torque Wrench 1331 5-50Nm -VAG1331-

Battery Fan 1 -V457- is installed under a ventilation guide on the right side of the Hybrid Battery Unit -AX1-.

Be careful not to damage the foam seal on the ventilation guide when removing and installing Battery Fan 1 -V457- and that it seals the contact surface all the way around.

It is not necessary to de-energize the high-voltage system.



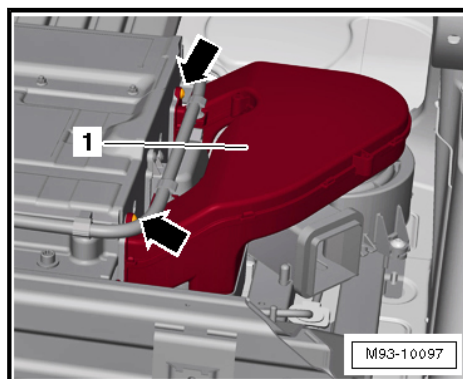
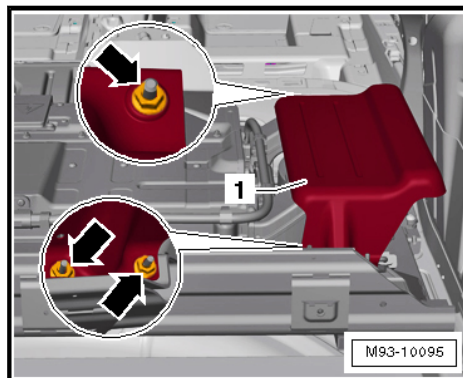
WARNING

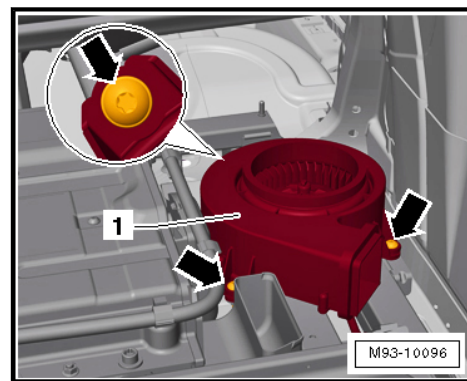
Read and follow the High-Voltage Electrical System General Warnings. Refer to ➔ [S1 ystem Warnings", page 1](#) .

Removing

The Hybrid Battery Unit -AX1- is not removed.

- Remove the nuts from the reinforcement -1- -arrows- and then remove the reinforcement -1-.
- Remove the screws from the exhaust air guide -1- -arrows- and then remove the exhaust air guide -1-.
- Release and disconnect the connector -2- from Battery Fan 1 -V457- -1-.





- Remove the 3 screws -arrows- from Battery Fan 1 -V457- -1- and then remove the Battery Fan 1 -V457-.

Installing

- Install in reverse order of removal. Note the following:

Tightening Specifications

- ◆ Refer to ➤ [-4.2 High-Voltage Battery”, page 15](#)

4.7 Battery Fan Air Guide Channel, Removing and Installing

The air supply duct routes air taken from the passenger compartment to the Hybrid Battery Unit -AX1-. The air supply duct has two sections: The front section is installed under the rear seat bench and the rear section is attached under the Hybrid Battery Unit -AX1-.

The right and left air supply air ducts are attached to the Hybrid Battery Unit -AX1- under the supply air duct reinforcements.

The right and left air supply air ducts are attached to the Hybrid Battery Unit -AX1- under the exhaust air duct reinforcements.

An exhaust air connecting duct is installed under the Hybrid Battery Unit -AX1-.

The high-voltage system must be de-energized only with the air guide ducts under the Hybrid Battery Unit -AX1-.



WARNING

Read and follow the High-Voltage Electrical System General Warnings. Refer to ➤ [S1 system Warnings”, page 1](#).

Be careful not to damage the foam seals on the air guide ducts when removing and installing the air guide ducts. Also, make sure the separating surfaces on the air guide ducts are completely sealed.

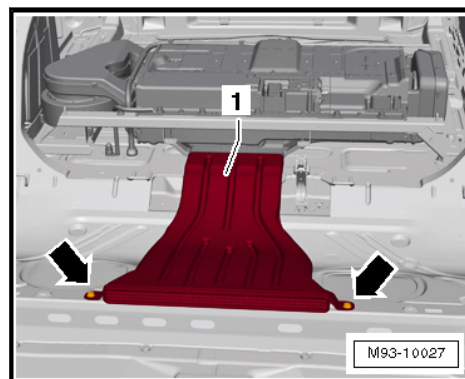
- Remove the rear bench seat. Refer to ➤ Body Interior; Rep. Gr. 72; Rear Seats.
- Remove the rear seat backrest. Refer to ➤ Body Interior; Rep. Gr. 72; Rear Seats.
- Remove the battery cover. Refer to ➤ Body Interior; Rep. Gr. 70; Luggage Compartment Trim Panels.
- Remove the luggage compartment floor. Refer to ➤ Body Interior; Rep. Gr. 70; Luggage Compartment Trim Panels.



- Remove the luggage compartment side trim panel. Refer to
⇒ Body Interior; Rep. Gr. 70; Luggage Compartment Trim
Panels.

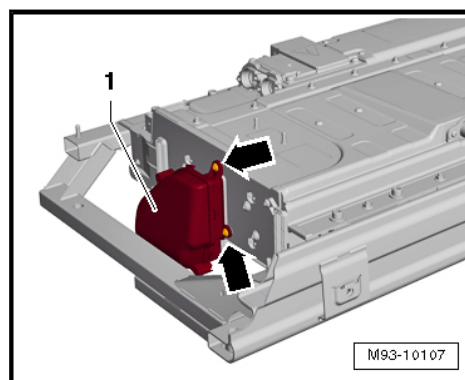
Removing Front Air Supply Duct

- Remove the mounts -arrows- on the air supply duct -1- and
then remove the air supply duct -1- forward.



Removing Left Air Supply Duct

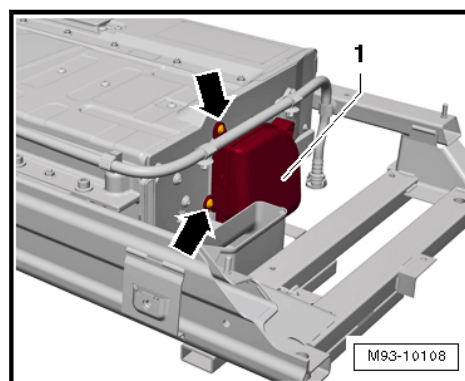
- Remove the left exhaust air duct. Refer to ⇒ [page 37](#) .
- Remove the screws from the air supply duct -1- -arrows-.



- Remove the air supply duct -1- from the Hybrid Battery Unit
-AX1-.

Removing Right Air Supply Duct

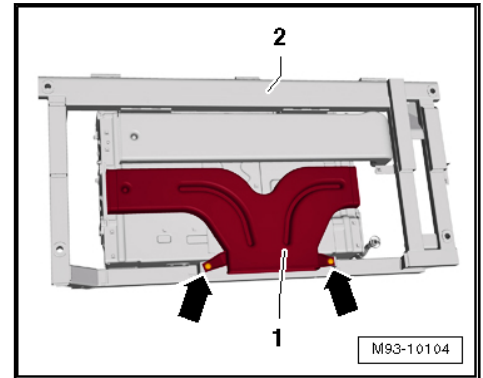
- Remove Battery Fan 1 -V457-.
- Remove the screws from the air supply duct -1- -arrows-.



- Remove the air supply duct -1- from the Hybrid Battery Unit
-AX1-.

Removing Air Guide Duct Rear Section

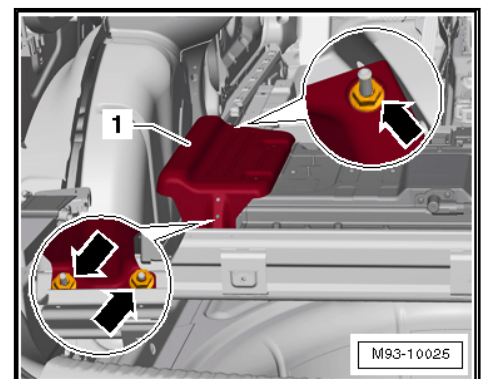
- Remove the left air supply duct. Refer to ➤ [page 36](#) .
- Remove the right air supply duct. Refer to ➤ [page 36](#) .
- Remove the Hybrid Battery Unit -AX1-. Refer to ➤ [H4.3.2 ybrid Battery Unit AX1, Removing and Installing", page 18](#) .



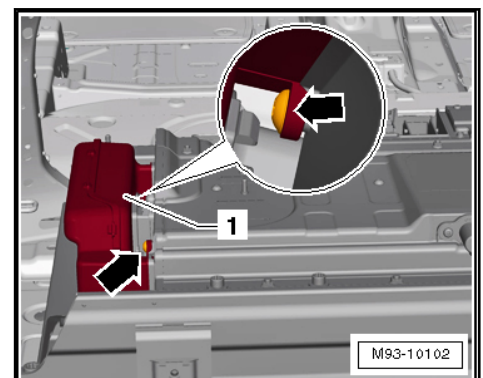
- Remove the screws -arrows- on the bottom of the air supply duct -1- and then remove the air supply duct -1- from the Hybrid Battery Unit -AX1- -2-.

Removing Left Exhaust Air Duct

- Remove the nuts -arrows- on the reinforcement -1- and then remove the reinforcement -1- from the Hybrid Battery Unit -AX1-.

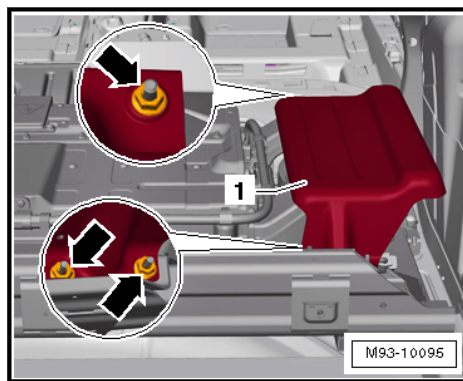


- Remove the screws from the exhaust air guide -1- -arrows- and then remove the exhaust air guide -1-.

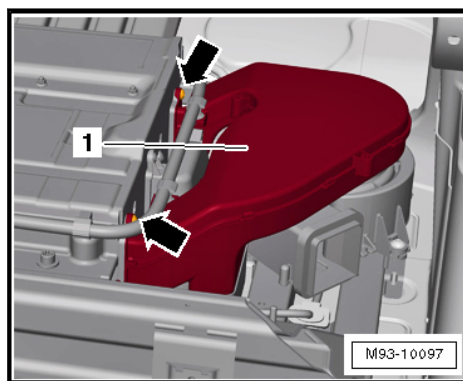


Removing Right Exhaust Air Duct

- Remove the nuts from the reinforcement -1- -arrows- and then remove the reinforcement -1-.

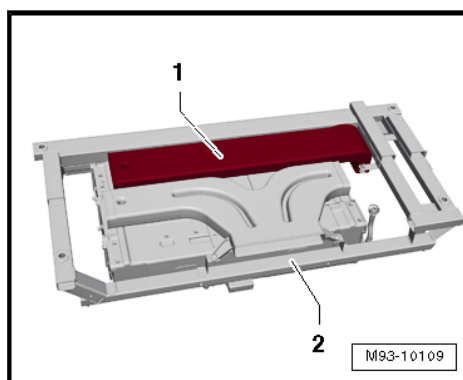


- Remove the screws from the exhaust air guide -1- -arrows- and then remove the exhaust air guide -1-.



Remove Exit Air Connecting Duct

- Remove the left exhaust air duct. Refer to ➤ [page 37](#) .
- Remove the right exhaust air duct. Refer to ➤ [page 37](#) .
- Remove the Hybrid Battery Unit -AX1-. Refer to ➤ [H4.3.2 ybrid Battery Unit AX1, Removing and Installing](#)”, [page 18](#) .
- Remove the lower exhaust air connecting duct -1- from the Hybrid Battery Unit -AX1- -2-.



Installing

Install in reverse order of removal. Note the following:

- Restart the high-voltage system and complete the required documentation. Refer to ➤ [S8.4 ystem, Re-Energizing](#)”, [page 66](#) .

Tightening Specifications

- ◆ Refer to ➤ [-4.2 High-Voltage Battery](#)”, [page 15](#)



4.8 High-Voltage Battery, Charging



WARNING

*Read and follow the High-Voltage Electrical Equipment General Safety Precautions. Refer to ➔ **S1 ystem Warnings**, page 1.*

- ◆ *Danger of serious burns or death.*
- ◆ *Only a technician specializing in electrical systems, specializing in specific work on electrical systems (hybrid) or a high-voltage expert may charge the Hybrid Battery.*
- ◆ *Use High-Voltage Battery Charger -VAS6565- with its cables to charge the Hybrid Battery -A38-.*

Only the following persons are permitted to charge the Hybrid Battery -A38-:

- ◆ High-Voltage Expert (HVE)
- ◆ Technicians specializing in specific work on electrical systems (hybrid)
- ◆ High-Voltage Technicians (HVT)

Use the High-Voltage Battery Charger -VAS6565- with the corresponding Jetta Charge Cable -VAS6565/2- to charge the Hybrid Battery -A38-.

- Connect the Vehicle Diagnostic Tester.
- Select **Guided Functions**.
- Use the **GO TO** button to select the “function/component selection” and the following menu options one after the other:
 - ◆ Body
 - ◆ Electrical Equipment
 - ◆ 01 - OBD
 - ◆ Hybrid battery management
 - ◆ Hybrid battery management functions
 - ◆ Battery, charging

5 Electric Drive Power and Control Electronics

⇒ [D5.1 rive Power and Control Electronics, General Description", page 40](#)

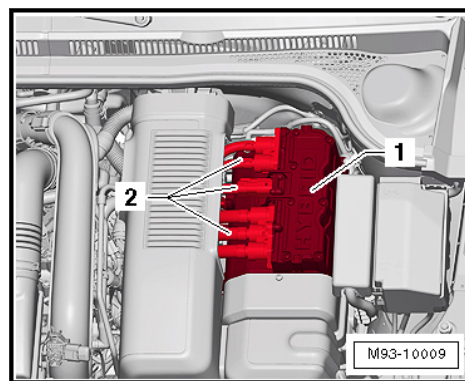
⇒ [-5.2 Electric Drive Power and Control Electronics", page 41](#)

⇒ [D5.3 rive Output and Control Electronics, Removing and Installing", page 43](#)

⇒ [D5.4 rive Power and Control Electronics, Replacing", page 49](#)

5.1 Electric Drive Power and Control Electronics, General Description

Electric Drive Power and Control Electronics -JX1- -1- consists of the Electro-Drive Drive Motor -V141- and the Hybrid Battery Unit -AX1-. It contains the Voltage Converter -A19-, the Drive Motor Inverter -A37- and the Electrical Drive Control Module -J841-.



The Drive Motor Inverter -A37- changes the 222 V direct current in the Hybrid Battery -A38- to 360 V alternating current when the vehicle is being driven by the Electro-Drive Drive Motor -V141-. The Voltage Converter -A19- changes the high-voltage to low voltage to supply the 12V vehicle electrical system. The Electric Drive Power and Control Electronics -JX1- is water cooled and is installed in the engine compartment on the left front side.

The following high-voltage cables are connected to the Electric Drive Power and Control Electronics -JX1- -2-:

- ◆ Hybrid Battery High-Voltage Cable, Positive Terminal -P1- to the Hybrid Battery Unit -AX1-
- ◆ Hybrid Battery High-Voltage Cable, Negative Terminal -P2- to the Hybrid Battery Unit -AX1-
- ◆ Drive Motor High-Voltage Cable 1 -P4- to the Electro-Drive Drive Motor -V141-
- ◆ Drive Motor High-Voltage Cable 2 -P5- to the Electro-Drive Drive Motor -V141-
- ◆ Drive Motor High-Voltage Cable 3 -P6- to the Electro-Drive Drive Motor -V141-
- ◆ Electrical A/C Compressor High-Voltage Cable - P3- to the Electrical A/C Compressor -V470-

The fuse for the Electrical A/C Compressor -V470- is integrated in the Electric Drive Power and Control Electronics -JX1-. Re-

moving and installing. Refer to ➤ [E5.3.3 Electrical A/C Compressor V470 Fuse, Removing and Installing](#), page 47.

Always perform the procedure for replacing the Electric Drive Power and Control Electronics -JX1- if the Electric Drive Power and Control Electronics -JX1- is being replaced. Refer to ➤ [D5.4 rive Power and Control Electronics, Replacing](#), page 49.

5.2 Overview - Electric Drive Power and Control Electronics

➤ [-5.2.1 Electric Drive Power and Control Electronics JX1](#), page 41

5.2.1 Overview - Electric Drive Power and Control Electronics -JX1-

1 - Bolt

- 7 Nm
- Quantity: 7

2 - Cover

3 - Bolt

- 20 Nm
- Quantity: 5

4 - Bolt

- 9 Nm
- Quantity: 4

5 - High-Voltage Connection Cover Plate

6 - Bolt

- 9 Nm
- Quantity: 2

7 - Bolt

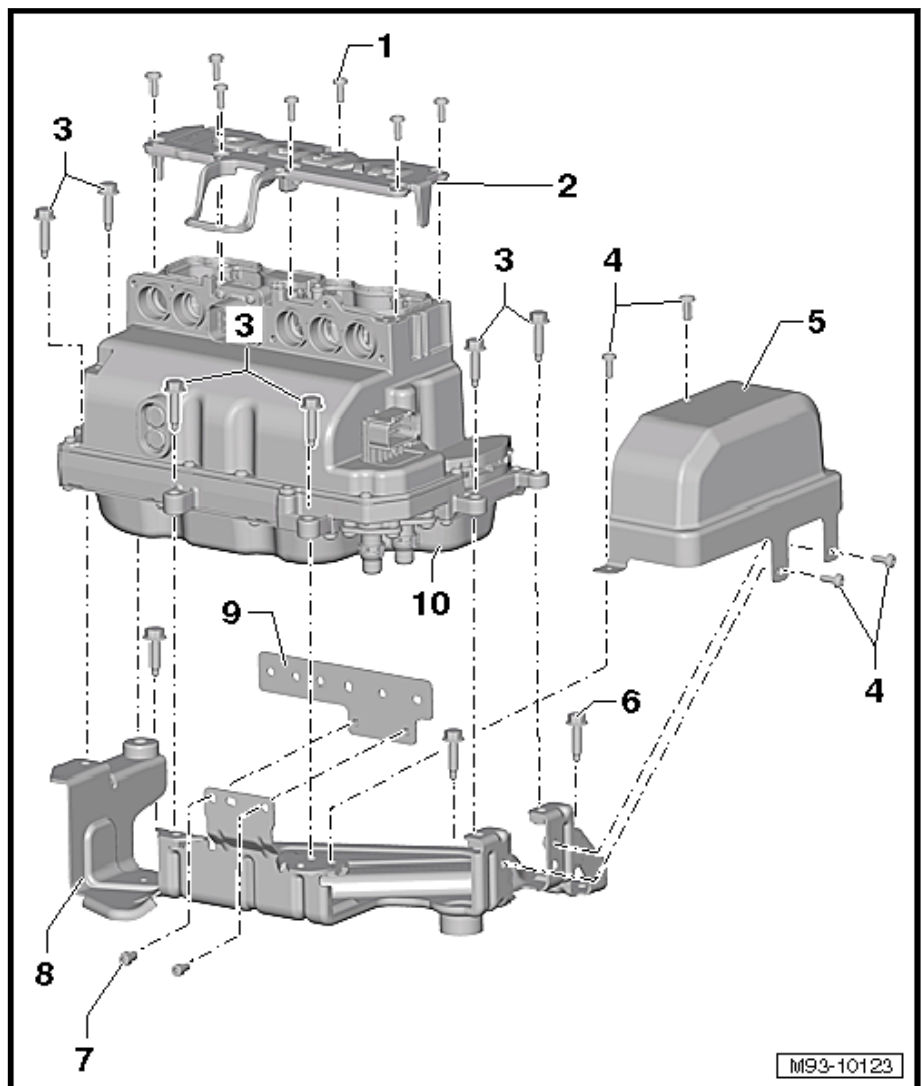
- 8 Nm
- Quantity: 2

8 - Bracket

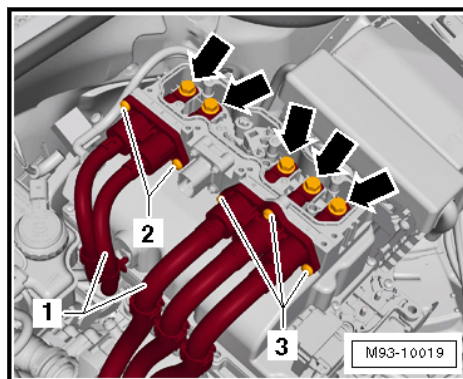
9 - Cable Bracket

10 - Electric Drive Power and Control Electronics -JX1-

- Removing and installing. Refer to ➤ [D5.3 rive Output and Control Electronics, Removing and Installing](#), page 43.

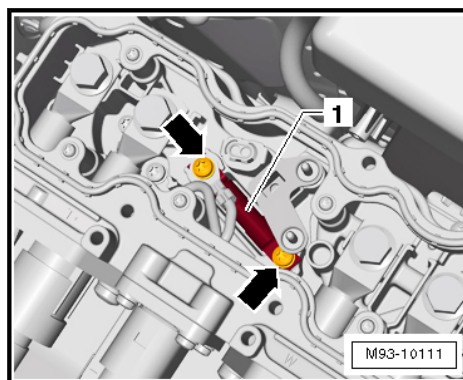


Tightening Specifications, High-Voltage Contacts



- ◆ High-voltage contacts -arrows-: 20 Nm
- ◆ Threaded connection -2 and 3-: 5 Nm

Tightening Specifications for the Electrical A/C Compressor - V470- Fuse



- ◆ Screws -arrows-: 3 Nm

Tightening Specifications for Terminal 30/terminal 31

- ◆ Nuts: 20 Nm



5.3 Electric Drive Output and Control Electronics, Removing and Installing

⇒ [E5.3.1 Electric Drive Power and Control Electronics JX1, Visual Inspection](#), page 43

⇒ [E5.3.2 Electric Drive Power and Control Electronics JX1, Removing and Installing](#), page 43

⇒ [E5.3.3 Electrical A/C Compressor V470 Fuse, Removing and Installing](#), page 47

5.3.1 Electric Drive Power and Control Electronics -JX1-, Visual Inspection



WARNING

Inspect the Electric Drive Power and Control Electronics - JX1- for:

- ◆ *Traces of fluid on the water connections*
- ◆ *Damage on the housing and the connector*
- ◆ *High coolant level in the low temperature coolant circuit reservoir*
- ◆ *Applicable potential equalization cable. Refer to ⇒ [E8.2 Equalization Cables, General Information](#), page 64.*

5.3.2 Electric Drive Power and Control Electronics -JX1-, Removing and Installing

Special tools and workshop equipment required

- ◆ Torque Wrench 1331 5-50Nm -VAG1331-
- ◆ Hose Clamps - Up To 25mm -3094-



WARNING

Read and follow the High-Voltage Electrical System General Warnings. Refer to ⇒ [S1 System Warnings](#), page 1.



Caution

Pay attention to the instructions for handling high-voltage cables. Refer to ⇒ [S1 System Warnings](#), page 1.



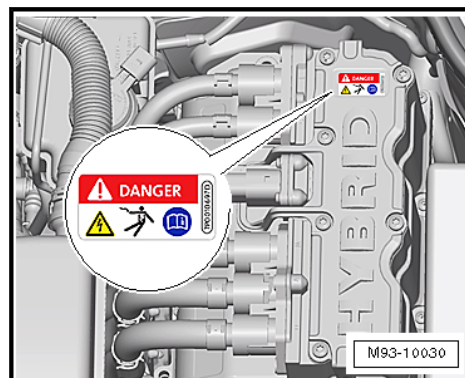
WARNING

Hybrid vehicle high-voltage in the high-voltage system. Danger of electrocution! The following procedure requires working on the high-voltage system. Disable the high-voltage system now. Refer to ⇒ [S8.3 System, De-Energizing](#), page 66.

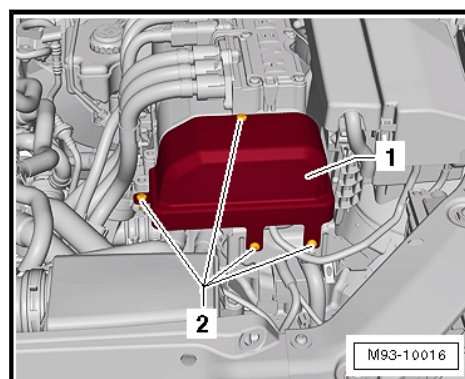


Removing

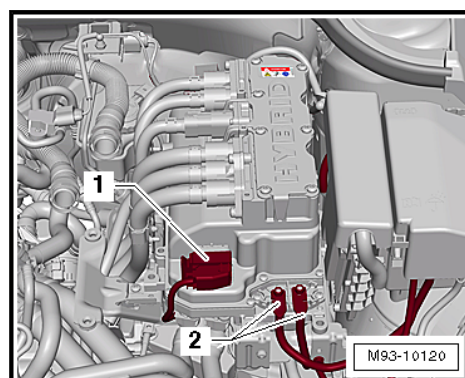
- Disable the high-voltage system. Refer to ➔ [S8.3 system, De-Energizing](#), page 66 .
- Disconnect the 12V battery. Refer to ➔ Electrical Equipment; Rep. Gr. 27; Battery; Battery, Disconnecting and Connecting.
- Remove the air damper. Refer to ➔ Engine Mechanical, Fuel Injection and Ignition; Rep. Gr. 26; Secondary Air Injection System.
- Be careful not to damage the red warning label on the Electric Drive Power and Control Electronics -JX1-.



Remove the cover -1- first.

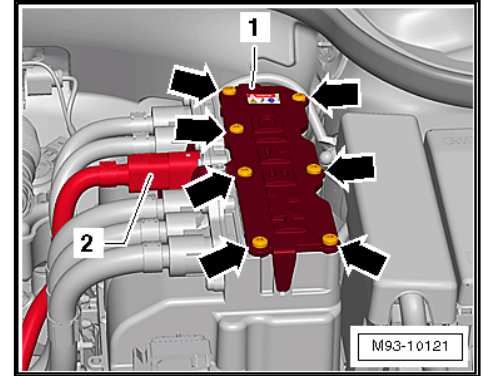


- Remove the screws -2- and then remove the cover -1- from the Electric Drive Power and Control Electronics -JX1-.
- Remove the cover from terminal 30/terminal 31.



- Unscrew and remove terminal 30/terminal 31 -2-.
- Remove the connector -1-.

- Loosen the potential equalization cable from the Electric Drive Power and Control Electronics -JX1-. Refer to ➤ [Fig. "Potential Equalization Cable to Electric Drive Power and Control Electronics -JX1- -1- "](#), page 65
- Disconnect and remove the Electric A/C Compressor High-Voltage Cable -P3- -2-.

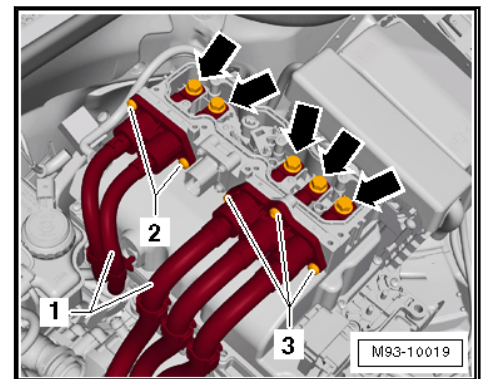


- Remove the bolts on the cover -1- -arrows- and then remove the cover -1-.



Note

- ◆ *Be careful not to damage the seal inside the cover.*
- ◆ *The power and control unit cover must be replaced after removal, if the seal at the cover is damaged. If the seal at the cover is OK, then the same cover can be installed again.*
- Remove the bolts from the high-voltage connections -arrows-.



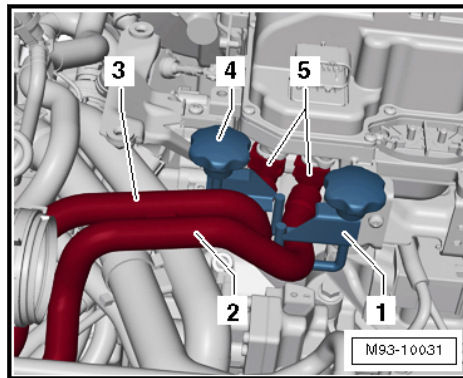
- Remove the bolts from the high-voltage cables -2 and 3-.
- Pull the high-voltage cables -1- carefully with light movements out of the Electric Drive Power and Control Electronics -JX1-.



Note

Be careful not to damage the seals on the high-voltage cables.

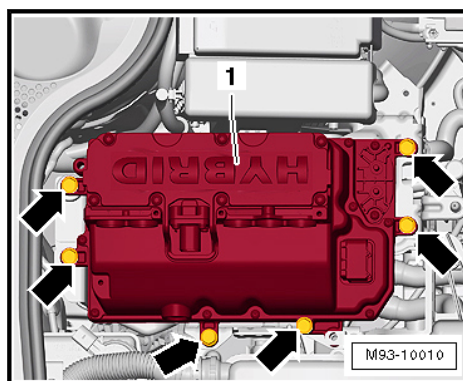
- Clamp off both coolant lines -2 and 3- with Hose Clamps - Up To 25mm -3094- -1 and 4-.



Note

Catch the escaping coolant in a suitable container.

- Open and remove both hose couplings -5-.
- Remove the screws -arrows- and then remove the Electric Drive Power and Control Electronics -JX1- -1- from the bracket.



Installing

Install in reverse order of removal. Note the following:

Check the contact surfaces on the potential equalization cable before installation.

The contact surfaces must be clean. There must be no rust or grease on them.

If needed, clean the contact surfaces using the Contact Surface Cleaning Set -VAS6410-. Refer to ⇒ Electrical Equipment; Rep. Gr. 97; Contact Surfaces, Cleaning.



Note

Be careful not to damage the seals on the high-voltage cables.

- Connect the 12V battery. Refer to ⇒ Electrical Equipment; Rep. Gr. 27; Battery; Overview - Battery.
- Restart the high-voltage system and complete the required documentation. Refer to ⇒ [S8.4 ystem, Re-Energizing](#), [page 66](#) .



- Bleed the low temperature coolant circuit. Refer to ➤ Engine Mechanical, Fuel Injection and Ignition; Rep. Gr. 19; Coolant System/Coolant.

Always perform the procedure for replacing the Electric Drive Power and Control Electronics -JX1- if the Electric Drive Power and Control Electronics -JX1- is being replaced. Refer to ➤ [D5.4 rive Power and Control Electronics, Replacing](#), page 49 .

The Electro-Drive Drive Motor -V141- will automatically calibrate at the end of "Guided Fault Finding" once all Diagnostic Trouble Code (DTC) entries are erased.

The "calibration" must be performed each time the DTC memory for the Electric Drive Power and Control Electronics -JX1-, Battery Regulation Control Module -J840-, engine or transmission is "erased". Otherwise the vehicle will only start after the second try.

Tightening Specifications

- ◆ Refer to ➤ [-5.2.1 Electric Drive Power and Control Electronics JX1](#) ", page 41

5.3.3 Electrical A/C Compressor -V470- Fuse, Removing and Installing



WARNING

Read and follow the High-Voltage Electrical System General Warnings. Refer to ➤ [S1 ystem Warnings](#)", page 1 .

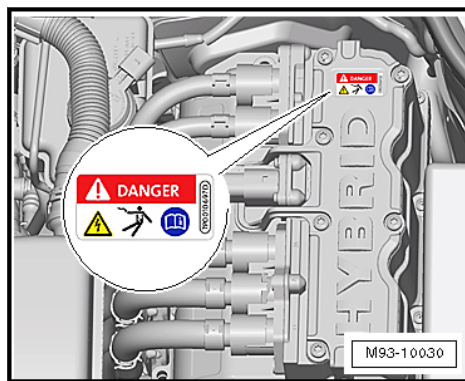


WARNING

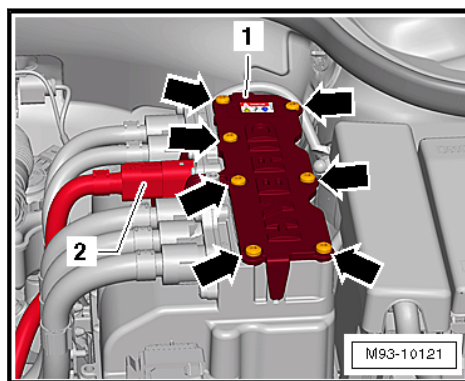
Hybrid vehicle high-voltage in the high-voltage system. Danger of electrocution! The following procedure requires working on the high-voltage system. Disable the high-voltage system now. Refer to ➤ [S8.3 ystem, De-Energizing](#)", page 66 .

Removing

- Disable the high-voltage system. Refer to ➤ [S8.3 ystem, De-Energizing](#)", page 66 .
- Disconnect the 12V battery. Refer to ➤ Electrical Equipment; Rep. Gr. 27; Battery; Overview - Battery.
- Remove the air damper. Refer to ➤ Engine Mechanical, Fuel Injection and Ignition; Rep. Gr. 26; Secondary Air Injection System.
- Be careful not to damage the red warning label on the Electric Drive Power and Control Electronics -JX1-.

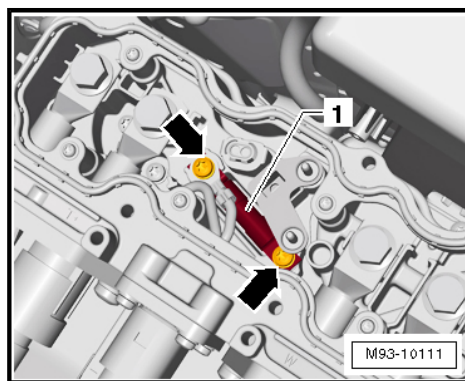


- Remove the bolts -arrows- on the cover -1- and then remove the cover -1-.



Note

- ♦ *Be careful not to damage the seal inside the cover.*
- ♦ *The power and control unit cover must be replaced after removal, if the seal at the cover is damaged. If the seal at the cover is OK, then the same cover can be installed again.*
- Remove the screws -arrows- from the Electrical A/C Compressor -V470- fuse .



- Remove the Electrical A/C Compressor -V470- fuse -1- from the Electric Drive Power and Control Electronics -JX1-.

Installing

Install in reverse order of removal. Note the following:

- Connect the 12V battery. Refer to ➤ Electrical Equipment; Rep. Gr. 27; Battery; Overview - Battery.



- Restart the high-voltage system and complete the required documentation. Refer to [⇒ S8.4 ystem, Re-Energizing](#), [page 66](#).

Tightening Specifications

- ◆ Refer to [⇒ -5.2 Electric Drive Power and Control Electronics](#), [page 41](#)

5.4 Electric Drive Power and Control Electronics, Replacing

If the Electric Drive Power and Control Electronics -JX1- is replaced, always complete the following adaptations in the order listed:

Connect the Vehicle Diagnostic Tester.

- Select **Guided Functions**.
- Using the **GO TO** button, select the following menu points:

1. Adapt the Electric Drive Power and Control Electronics -JX1- to the immobilizer.

- ◆ Body
- ◆ Electrical Equipment
- ◆ 01 - OBD
- ◆ 51 - Electric drive J841
- ◆ 51 - Electric drive functions
- ◆ Adapt electric drive power and control electronics to immobilizer

2. Code the Electric Drive Power and Control Electronics -JX1-

- ◆ Body
- ◆ Electrical Equipment
- ◆ 01 - OBD
- ◆ 51 - Electric drive J841
- ◆ 51 - Electric drive functions
- ◆ 51 - Code control module (repair group 93)

3. Calibrate the Electro-Drive Drive Motor -V141-.

- ◆ Body
- ◆ Electrical Equipment
- ◆ 01 - OBD
- ◆ 51 - Electric drive J841
- ◆ 51 - Electric drive functions
- ◆ 51 - Calibrate electro-drive drive motor (repair group 93)



6 Electro-Drive Drive Motor

⇒ [E6.1 lectro-Drive Drive Motor V141, General Description", page 50](#)

⇒ [D6.2 rive Motor, Removing and Installing", page 50](#)

6.1 Electro-Drive Drive Motor -V141-, General Description

The Electro-Drive Drive Motor -V141- is positioned between the internal combustion engine and the transmission. It works directly with the transmission input shaft and performs the following:

- ◆ It functions like an engine to drive the vehicle with electricity only.
- ◆ It functions like a generator to supply and charge the vehicle electrical system and the Hybrid Battery -A38- with electric current.
- ◆ It functions as a starter to start the internal combustion engine.

It is not possible to open or disassemble the Electro-Drive Drive Motor -V141-.

6.2 Electro-Drive Drive Motor, Removing and Installing

⇒ [E6.2.1 lectro-Drive Drive Motor V141, Removing and Installing", page 50](#)

⇒ [D6.2.2 rive Motor Rotor Position Sensor 1 G713, Removing and Installing", page 51](#)

6.2.1 Electro-Drive Drive Motor -V141-, Removing and Installing



WARNING

Read and follow the High-Voltage Electrical System General Warnings. Refer to ⇒ [S1 ystem Warnings", page 1](#) .



Caution

Pay attention to the instructions for handling high-voltage cables. Refer to ⇒ [C7.1 ables, General Description", page 53](#) .



WARNING

Hybrid vehicle high-voltage in the high-voltage system. Danger of electrocution! The following procedure requires working on the high-voltage system. Disable the high-voltage system now. Refer to ⇒ [S8.3 ystem, De-Energizing", page 66](#) .

Removing

- Disable the high-voltage system. Refer to ⇒ [S8.3 ystem, De-Energizing", page 66](#) .



- Remove the Electro-Drive Drive Motor -V141-. Refer to ➔ Rep. Gr. 10; Engine, Removing and Installing; Electric Drive Motor -V141-, Separating from Engine.

Installing

- Install the Electro-Drive Drive Motor -V141-. Refer to ➔ Rep. Gr. 10; Engine, Removing and Installing; Electric Drive Motor -V141-, Attaching to Engine.
- Restart the high-voltage system and complete the required documentation. Refer to ➔ [S8.4 ystem, Re-Energizing](#), [page 66](#).

The Electro-Drive Drive Motor -V141- will automatically calibrate at the end of "Guided Fault Finding" once all Diagnostic Trouble Code (DTC) entries are erased.

The "calibration" must be performed each time the DTC memory for the Electric Drive Power and Control Electronics -JX1-, Battery Regulation Control Module -J840-, engine or transmission is "erased". Otherwise the vehicle will only start after the second try.

6.2.2 Drive Motor Rotor Position Sensor 1 -G713-, Removing and Installing

Drive Motor Rotor Position Sensor 1 -G713- is attached to the transmission housing in the back of the engine compartment.



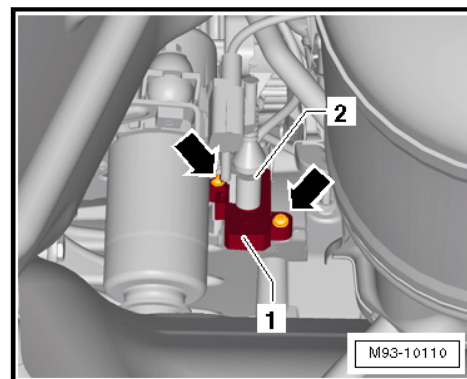
WARNING

Read and follow the High-Voltage Electrical System General Warnings. Refer to ➔ [S1 ystem Warnings](#), [page 1](#).

Removing

Drive Motor Rotor Position Sensor 1 -G713- is accessible from underneath.

- Drive the vehicle onto the vehicle hoist and lift it.
- Remove the noise insulation. Refer to ➔ Body Exterior; Rep. Gr. 66; Noise Insulation; Overview - Noise Insulation.
- Release and disconnect the connector -2- from the Drive Motor Rotor Position Sensor 1 -G713- -1-.



- Remove the screws -arrows- and then pull out the Drive Motor Rotor Position Sensor 1 -G713- -1-.

Installing

Install in reverse order of removal. Note the following:



- Tighten the threaded connections to the tightening specification. Refer to ➔ [page 52](#) .

Component	Tightening Specification
Drive Motor Rotor Position Sensor 1 -G713- bolt	12 Nm



7 High-Voltage Cables

⇒ [C7.1 ables, General Description", page 53](#)

⇒ [-7.2 High-Voltage Cables", page 54](#)

⇒ [B7.3 attery High-Voltage Cable Set, Removing and Installing", page 55](#)

⇒ [M7.4 otor High-Voltage Wiring Harness, Removing and Installing", page 59](#)

⇒ [A7.5 /C Compressor High-Voltage Cable, Removing and Installing", page 62](#)

7.1 High-Voltage Cables, General Description



WARNING

Working with high-voltage cables:

- ◆ *Do not support yourself or lay tools on the high-voltage cable or on any of its components.*
- ◆ *When working near high-voltage components and high-voltage cables, do not use tools that generate heat, that have sharp edges or that are used for cutting or shaping, such as welding, soldering, hot air or thermal adhesive equipment.*
- ◆ *When working near high-voltage components and high-voltage cables, do not use tools that generate heat such as welding, soldering, hot air or thermal adhesive equipment.*
- ◆ *Do not excessively bend or flex high-voltage cables.*
- ◆ *Always contact a high-voltage technician if there are questions or if something is not clearly understood.*

The following high-voltage cables connect the high-voltage components to each other.

High-Voltage Wiring Harness For High-Voltage Battery -PX1-:

Routing from the Hybrid Battery Unit -AX1- to the Electric Drive Power and Control Electronics -JX1-

Consists of two high-voltage cables

- ◆ Hybrid Battery High-Voltage Cable, Positive Terminal -P1-
- ◆ Hybrid Battery High-Voltage Cable, Negative Terminal -P2-

High-Voltage Wiring Harness For High-Voltage Battery -PX1- removing and installing. Refer to [⇒ B7.3 attery High-Voltage Cable Set, Removing and Installing", page 55](#)

Drive Motor High-Voltage Wiring Harness -PX2-:

Routing from the Electric Drive Power and Control Electronics -JX1- to the Electro-Drive Drive Motor -V141-

Consists of three high-voltage cables

- ◆ Drive Motor High-Voltage Cable 1 -P4-
- ◆ Drive Motor High-Voltage Cable 2 -P5-
- ◆ Drive Motor High-Voltage Cable 3 -P6-



Drive Motor High-Voltage Wiring Harness -PX2- removing and installing. Refer to ➤ [M7.4 otor High-Voltage Wiring Harness, Removing and Installing](#)", page 59

Electric A/C Compressor High-Voltage Cable -P3-:

Routing from the Electric Drive Power and Control Electronics -JX1- to the Electrical A/C Compressor -V470-

Electric A/C Compressor High-Voltage Cable -P3- removing and installing. Refer to ➤ [A7.5 /C Compressor High-Voltage Cable, Removing and Installing](#)", page 62 .

7.2 Overview - High-Voltage Cables

1 - Electrical A/C Compressor -V470-

2 - Electric Drive Power and Control Electronics -JX1-

3 - High-Voltage Wiring Harness For High-Voltage Battery -PX1-

- ❑ Routing from the Hybrid Battery Unit -AX1- to the Electric Drive Power and Control Electronics -JX1-
- ❑ Consists of Hybrid Battery High-Voltage Cable, Positive Terminal -P1-/Hybrid Battery High-Voltage Cable, Negative Terminal -P2-
- ❑ Removing and installing. Refer to ➤ [B7.3 at-tery High-Voltage Cable Set, Removing and Installing](#)", page 55 .

4 - Hybrid Battery Unit - AX1-

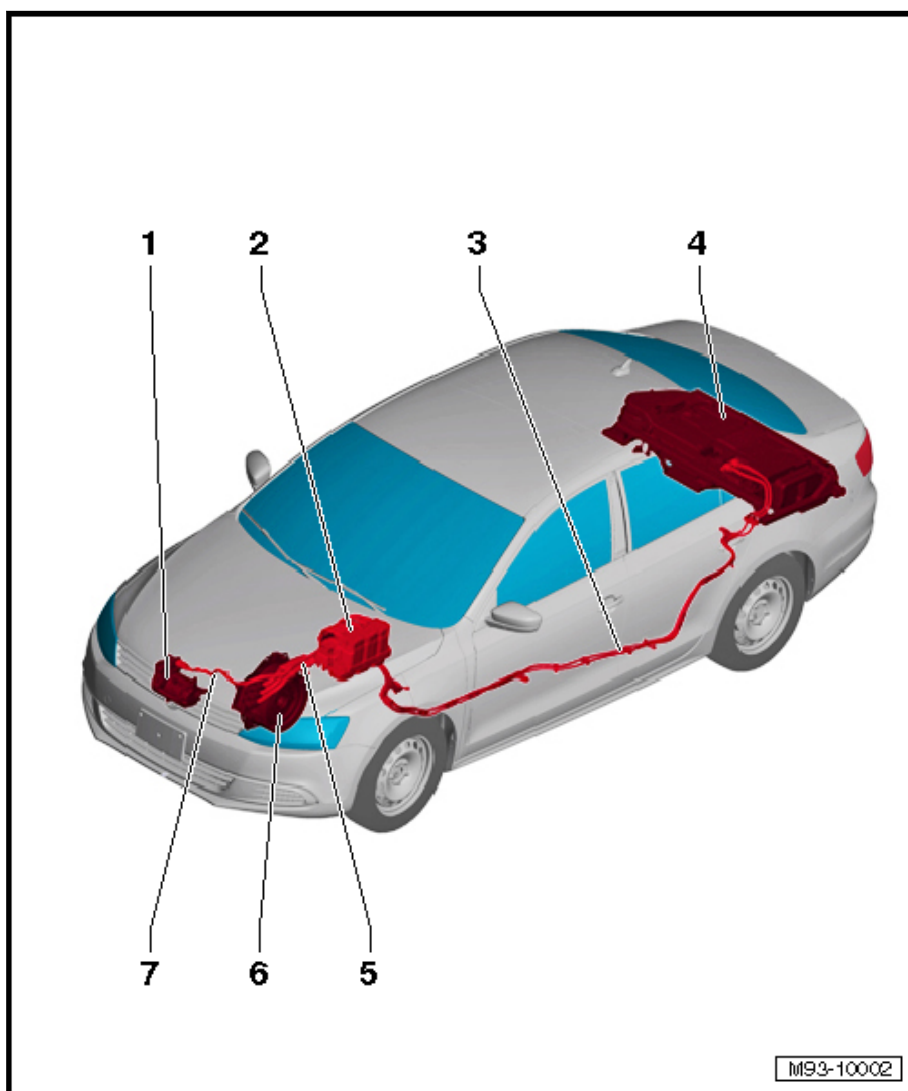
5 - Drive Motor High-Voltage Wiring Harness -PX2-

- ❑ Routing from the Electric Drive Power and Control Electronics -JX1- to the Electro-Drive Drive Motor -V141-
- ❑ Consists of Drive Motor High-Voltage Cable 1 -P4-/Drive Motor High-Voltage Cable 2 -P5-/ Drive Motor High-Voltage Cable 3 -P6-
- ❑ Removing and installing. Refer to ➤ [M7.4 otor High-Voltage Wiring Harness, Removing and Installing](#)", page 59 .

6 - Electro-Drive Drive Motor -V141-

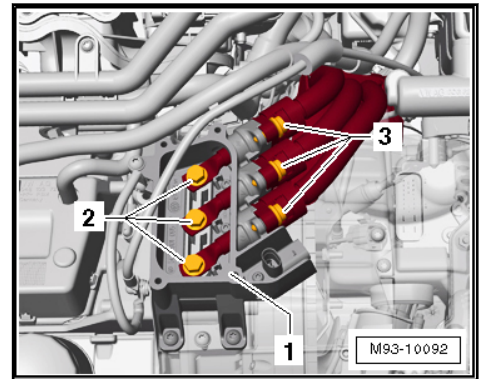
7 - Electric A/C Compressor High-Voltage Cable -P3-

- ❑ Routing from the Electric Drive Power and Control Electronics -JX1- to the Electrical A/C Compressor -V470-
- ❑ Removing and installing. Refer to ➤ [A7.5 /C Compressor High-Voltage Cable, Removing and Installing](#)", page 62 .



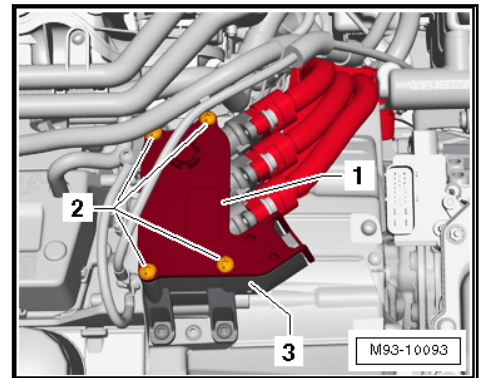


Tightening Specifications, High-Voltage Contacts Electro-Drive Drive Motor -V141-



- ◆ High-voltage contacts -2-: 20 Nm
- ◆ Threaded connection -3-: 5 Nm

Bolt Tightening Specification for the Electro-Drive Drive Motor -V141- Cover

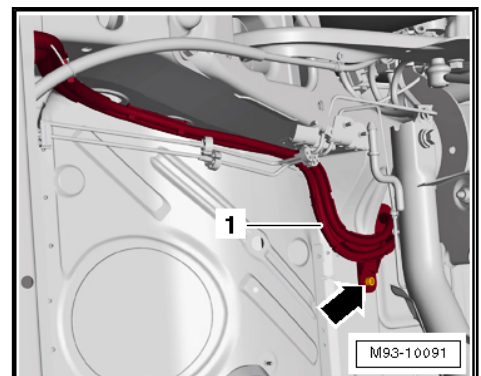


- ◆ Bolt -2-: 8 Nm

Tightening specifications for Electro-Drive Drive Motor -V141- protective plate: 8 Nm

Tightening specifications for Electro-Drive Drive Motor -V141- connection box: 8 Nm

Bolt Tightening Specification for the Wiring Guide -1-



- ◆ Bolt -arrow-: 20 Nm

7.3 High-Voltage Battery High-Voltage Cable Set, Removing and Installing

Special tools and workshop equipment required



- ◆ Torque Wrench 1331 5-50Nm -VAG1331-

The following cables make up the High-Voltage Wiring Harness For High-Voltage Battery -PX1-:

- ◆ Hybrid Battery High-Voltage Cable, Positive Terminal -P1-
- ◆ Hybrid Battery High-Voltage Cable, Negative Terminal -P2-



WARNING

Read and follow the High-Voltage Electrical System General Warnings. Refer to ➔ [S1 ystem Warnings](#)", page 1 .



Caution

Pay attention to the instructions for handling high-voltage cables. Refer to ➔ [C7.1 ables, General Description](#)", page 53 .



WARNING

Hybrid vehicle high-voltage in the high-voltage system. Danger of electrocution! The following procedure requires working on the high-voltage system. Disable the high-voltage system now. Refer to ➔ [S8.3 ystem, De-Energizing](#)", page 66 .



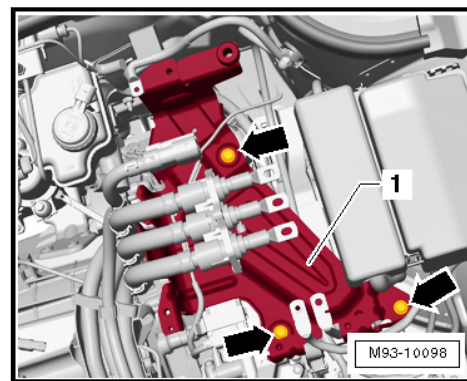
WARNING

Inspect the high-voltage cable for:

- ◆ *Damage to the orange colored insulation*
- ◆ *Debris on the connector*
- ◆ *Deformed cables*
- ◆ *Damage to the seals*

Removing

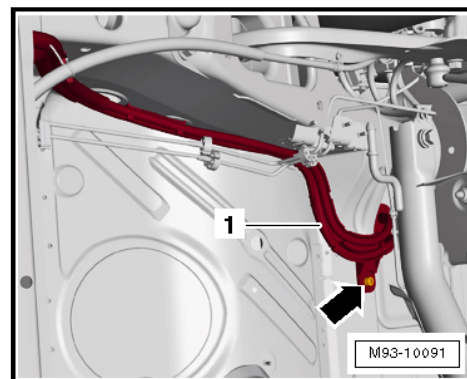
- Disable the high-voltage system. Refer to ➔ [S8.3 ystem, De-Energizing](#)", page 66 .
- Remove the Electric Drive Power and Control Electronics -JX1-. Refer to ➔ [D5.3 rive Output and Control Electronics, Removing and Installing](#)", page 43 .
- Remove the bolts -arrows- on the bracket -1-.



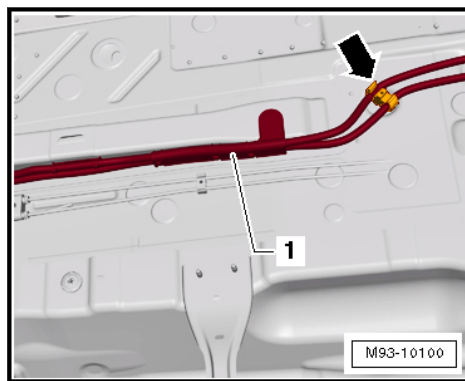
- Remove the bracket -1-.
- Remove the High-Voltage Wiring Harness For High-Voltage Battery -PX1- on the Hybrid Battery Unit -AX1-. Refer to [page 19](#).

Working on the bottom of the vehicle

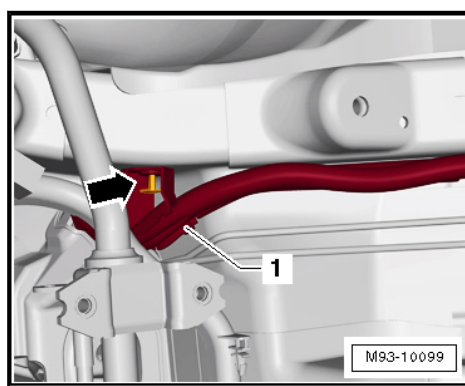
- Remove the front and rear noise insulation. Refer to ⇒ Body Exterior; Rep. Gr. 66; Noise Insulation; Overview - Noise Insulation.
- Remove the left underbody panels. Refer to ⇒ Body Exterior; Rep. Gr. 66; Underbody Trim Panel.
- Remove the rear muffler. Refer to ⇒ Rep. Gr. 26; Exhaust Pipes/Mufflers; Overview - Muffler.
- Remove the heat shield.
- Remove the bolt -arrow- on the back of the cable guide -1-.



- Cut the cable tie and remove the High-Voltage Wiring Harness For High-Voltage Battery -PX1- from the cable guide.
- Guide the High-Voltage Wiring Harness For High-Voltage Battery -PX1- downward out of the luggage compartment.
- Remove the cable bracket -1- on the underbody, disconnect the cable tie -arrow- and unclip the High-Voltage Wiring Harness For High-Voltage Battery -PX1-.



- Remove the cable bracket -arrow- on the bottom of the engine compartment in the front, disconnect the cable tie and unclip the High-Voltage Wiring Harness For High-Voltage Battery -PX1- -1-.

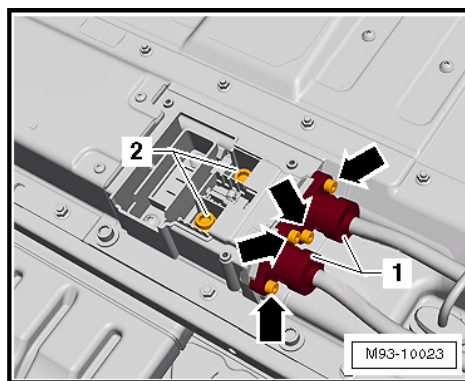


- Guide the High-Voltage Wiring Harness For High-Voltage Battery -PX1- downward out of the engine compartment.

Installing

Install in reverse order of removal. Note the following:

- Replace the bolts -arrows-.



All cable ties opened or cut during engine removal must be reinstalled at the same locations during installation.

Make sure the cable guide inside the luggage compartment floor is installed securely and sealed.

- Restart the high-voltage system and complete the required documentation. Refer to ➤ [S8.4 ystem, Re-Energizing](#), [page 66](#) .



Tightening Specifications

- ◆ Refer to ➤ [-5.2 Electric Drive Power and Control Electronics”, page 41](#)
- ◆ Refer to ➤ [-7.2 High-Voltage Cables”, page 54](#)

7.4 Drive Motor High-Voltage Wiring Harness, Removing and Installing

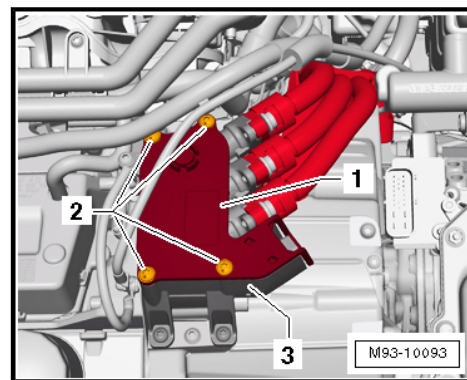
Special tools and workshop equipment required

- ◆ Torque Wrench 1331 5-50Nm -VAG1331-

The Drive Motor High-Voltage Wiring Harness -PX2- consists of the following cables:

- ◆ Drive Motor High-Voltage Cable 1 -P4-
- ◆ Drive Motor High-Voltage Cable 2 -P5-
- ◆ Drive Motor High-Voltage Cable 3 -P6-

The Drive Motor High-Voltage Wiring Harness -PX2- is connected to the Electro-Drive Drive Motor -V141- inside a sealed connection box -1-.



WARNING

Read and follow the High-Voltage Electrical System General Warnings. Refer to ➤ [S1 ystem Warnings”, page 1](#) .



Caution

Pay attention to the instructions for handling high-voltage cables. Refer to ➤ [C7.1 ables, General Description”, page 53](#) .



WARNING

Hybrid vehicle high-voltage in the high-voltage system. Danger of electrocution! The following procedure requires working on the high-voltage system. Disable the high-voltage system now. Refer to ➤ [S8.3 ystem, De-Energizing”, page 66](#) .



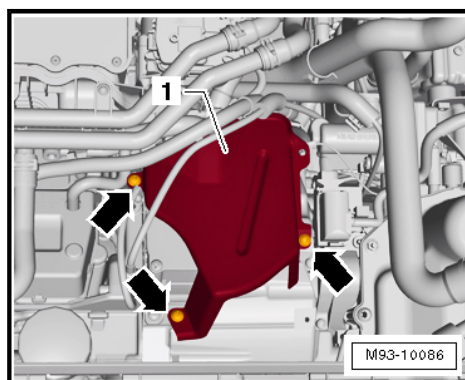
WARNING

Inspect the high-voltage cable for:

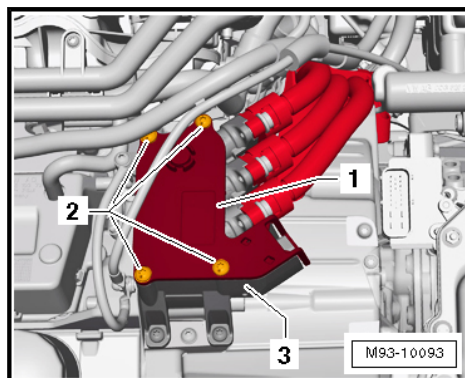
- ◆ *Damage to the orange colored insulation*
- ◆ *Debris on the connector*
- ◆ *Deformed cables*
- ◆ *Damage to the seals*

Removing

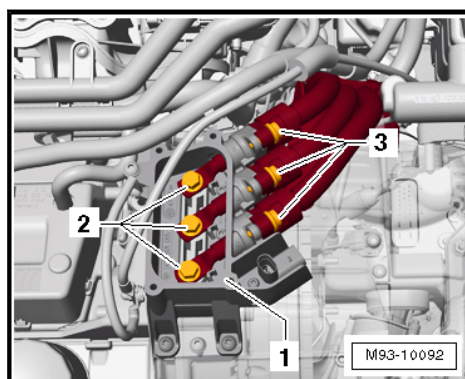
- Disable the high-voltage system. Refer to [⇒ S8.3 system, De-Energizing](#), page 66 .
- Remove the bolts -arrows- and the protective plate -1-.



- Remove the bolts -2- and remove the cover -1- from the connection box -3-.



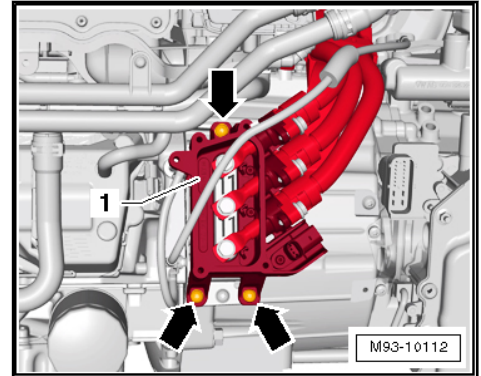
- Remove the bolts -2- from the high-voltage cables.



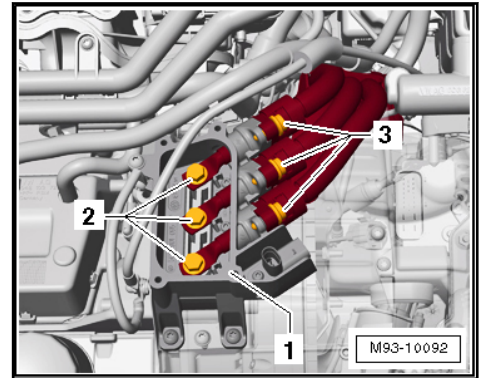


It is necessary to first remove the connection box in order to remove the bolts -3- on the connection box -1-.

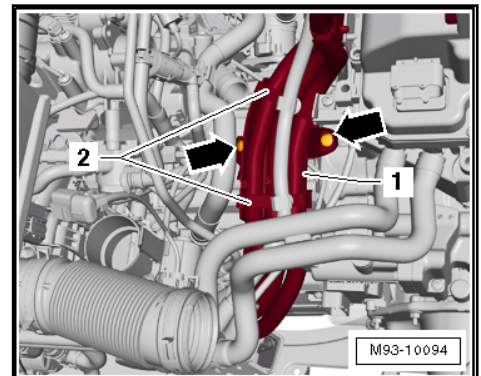
- Remove the bolts -arrows- on the connection box -1-.



- Turn the connection box -1- to the side until the bolts on the cable holder are accessible.
- Remove the bolts -3- from the cable holders.



- Pull out the high-voltage cables out of the connection box -1- one after the other.
- Open the clamp -2- on the cable bracket -1- and remove the Drive Motor High-Voltage Wiring Harness -PX2-.



- Guide the Drive Motor High-Voltage Wiring Harness -PX2- toward the Electric Drive Power and Control Electronics -JX1- and remove it.

Installing

Install in reverse order of removal. Note the following:

- Restart the high-voltage system and complete the required documentation. Refer to [⇒ S8.4 ystem, Re-Energizing](#), [page 66](#).



Tightening Specifications

- ◆ Refer to ➤ [-7.2 High-Voltage Cables”, page 54](#)

7.5 Electrical A/C Compressor High-Voltage Cable, Removing and Installing



WARNING

Read and follow the High-Voltage Electrical System General Warnings. Refer to ➤ [S1 ystem Warnings”, page 1](#) .



Caution

Pay attention to the instructions for handling high-voltage cables. Refer to ➤ [C7.1 ables, General Description”, page 53](#) .



WARNING

Hybrid vehicle high-voltage in the high-voltage system. Danger of electrocution! The following procedure requires working on the high-voltage system. Disable the high-voltage system now. Refer to ➤ [S8.3 ystem, De-Energizing”, page 66](#) .



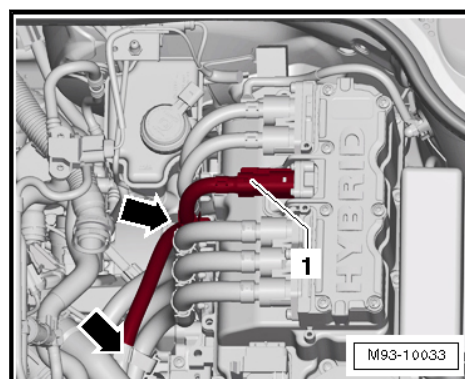
WARNING

Inspect the high-voltage cable for:

- ◆ *Damage to the orange colored insulation*
- ◆ *Debris on the connector*
- ◆ *Deformed cables*
- ◆ *Damage to the seals*

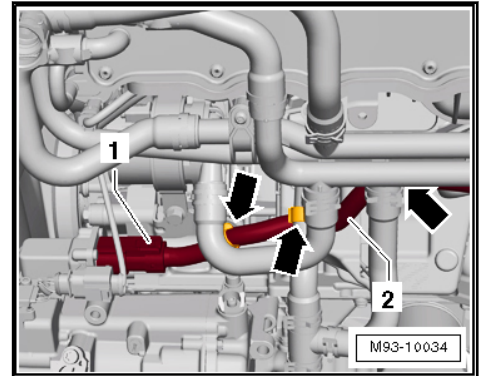
Removing

- Disable the high-voltage system. Refer to ➤ [S8.3 ystem, De-Energizing”, page 66](#) .
- Release and remove the Electrical A/C Compressor High-Voltage Cable -P3- -1- on the Electric Drive Power and Control Electronics -JX1-.



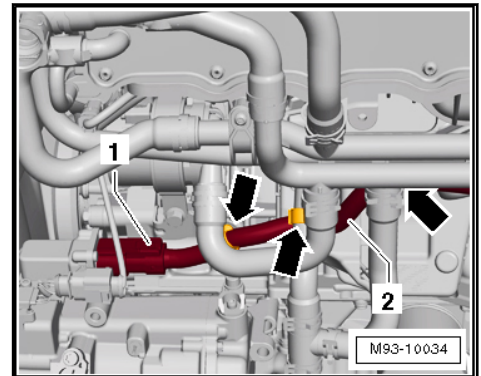


- Open the cable holder -arrows- and remove the Electrical A/C Compressor High-Voltage Cable -P3-.
- Open the cable holder -arrows- and remove the Electrical A/C Compressor High-Voltage Cable -P3- -2-.



The connector -1- on the Electrical A/C Compressor -V470- is accessible only if the Electrical A/C Compressor -V470- is removed beforehand. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor; Overview - A/C Compressor Power Unit.

- Release and remove the Electric A/C Compressor High-Voltage Cable -P3- -2- from the Electrical A/C Compressor -V470- -1-.



Installing

Install in reverse order of removal. Note the following:

- Restart the high-voltage system and complete the required documentation. Refer to ⇒ [S8.4 ystem, Re-Energizing](#), [page 66](#) .



8 High-Voltage System

⇒ [C8.1 ooling System, General Information", page 64](#)

⇒ [E8.2 qualization Cables, General Information", page 64](#)

⇒ [S8.3 ystem, De-Energizing", page 66](#)

⇒ [S8.4 ystem, Re-Energizing", page 66](#)

8.1 High-Voltage Cooling System, General Information



WARNING

The coolant system is under pressure when the engine is warm.

Danger of scalding by steam and hot coolant.

Reduce the pressure in the cooling system by covering the cap on the coolant reservoir with a cloth and opening it slowly and carefully.

Hybrid vehicles also have additional components in the cooling system that cool the hybrid components and that make sure the cooling system is working when the internal combustion engine is off and the vehicle is being driven electrically.

◆ High Temperature Circuit Coolant Pump -V467-

◆ Low Temperature Circuit Coolant Pump -V468-

Coolant system components, removing and installing. Refer to ⇒ Engine Mechanical, Fuel Injection and Ignition; Rep. Gr. 19; Coolant System/Coolant.

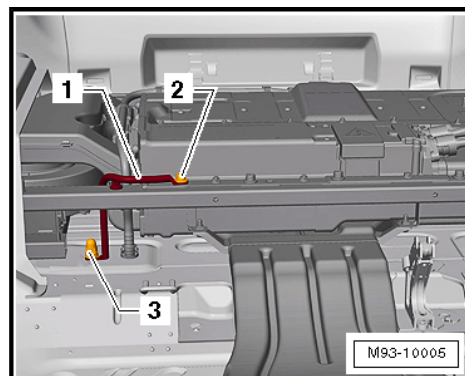
8.2 Potential Equalization Cables, General Information

Check the contact surfaces on the potential equalization cable before installation.

The contact surfaces must be clean. There must be no rust or grease on them.

If needed, clean the contact surfaces using the Contact Surface Cleaning Set -VAS6410-. Refer to ⇒ Electrical Equipment General Information; Rep. Gr. 97; Contact Surfaces, Cleaning.

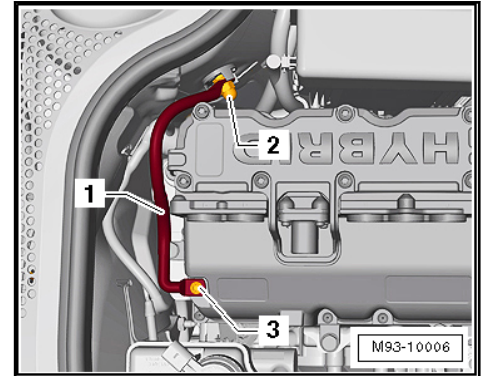
Potential Equalization Cable on the Hybrid Battery Unit -AX1-1-



Bolt tightening specification on battery frame -2-: 9 Nm

Nut tightening specification on the body -1-: 20 Nm

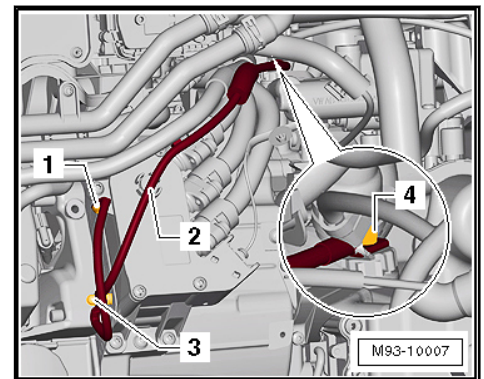
Potential Equalization Cable to Electric Drive Power and Control Electronics -JX1- -1-



Bolt tightening specification to Electric Drive Power And Control Electronics -JX1- -3- : 9 Nm

Nut tightening specification on the body -2-: 20 Nm

Potential Equalization Cable -2- on the Electro-Drive Drive Motor -V141-



Bolt tightening specification -1-: 8 Nm

Bolt tightening specification -3-: 8 Nm

Bolt tightening specification -4-: 20 Nm.



8.3 High-Voltage System, De-Energizing



WARNING

Individuals performing this task could receive an electrical shock.

An electrical shock can result in death.

Read and follow the High-Voltage Electrical System General Warnings. Refer to ➔ [S1 ystem Warnings](#), page 1 .

- ◆ *A high-voltage technician must disable the system before any work can be performed on the high-voltage electrical system or the vehicle body. To find out which procedures require this step. Refer to the table "Procedures that require the high-voltage system to be disabled:" and ➔ [page 2](#)*
- ◆ *Only technicians trained in electrical systems may work on vehicles with a high-voltage electrical system. All work must be performed by a high-voltage technician.*

Procedure

- Connect the Vehicle Diagnostic Tester.
- Select the `Diagnostic` mode and start the diagnosis.
- Select the `Test Plan` tab
- Select the `Select Individual Tests` button and select the following one after the other:
 - ◆ Body (Repair Group 01; 27; 50 through 97)
 - ◆ Interior/Exterior Electrical System (Repair group 01; 27; 50 - 97)
 - ◆ 01 - OBD
 - ◆ 8C - hybrid battery management | J840
 - ◆ 8C - hybrid battery energy management, functions
 - ◆ De-energizing the high-voltage system

8.4 High-Voltage System, Re-Energizing



WARNING

Individuals performing this task could receive an electrical shock.

An electrical shock can result in death.

Read and follow the High-Voltage Electrical System General Warnings. Refer to ➔ [S1 ystem Warnings](#), page 1 .

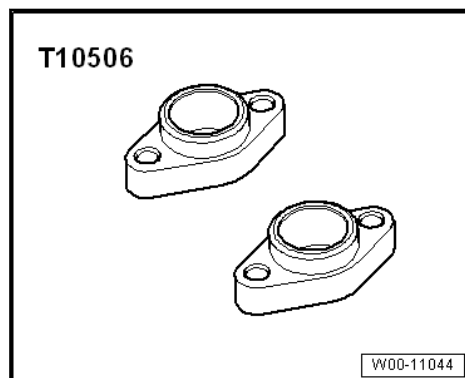
- ◆ *A high-voltage technician must disable the system before any work can be performed on the high-voltage electrical system or the vehicle body. To find out which procedures require this step. Refer to the table "Procedures that require the high-voltage system to be disabled:" and ➔ [page 2](#)*
- ◆ *Only technicians trained in electrical systems may work on vehicles with a high-voltage electrical system. All work must be performed by a high-voltage technician.*



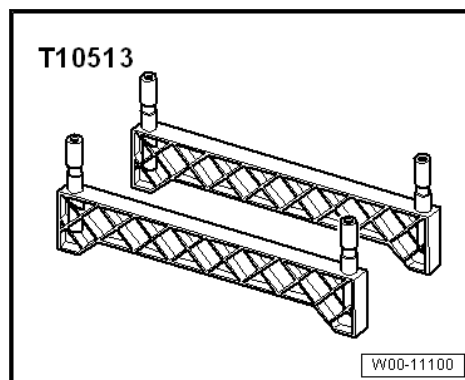
9 Special Tools

Special tools and workshop equipment required

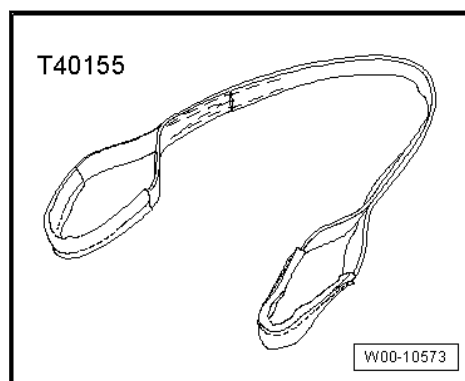
- ◆ Sealing Caps - High-Voltage -T10506-



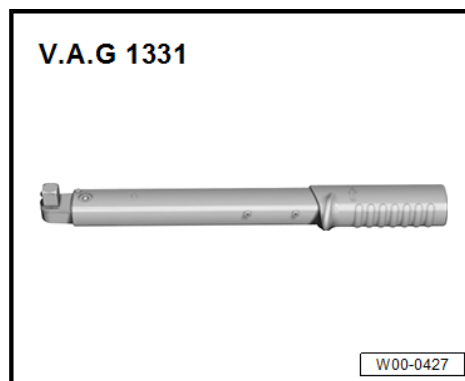
- ◆ Battery Supports -T10513-



- ◆ Retaining Strap -T40155- (quantity: 2)

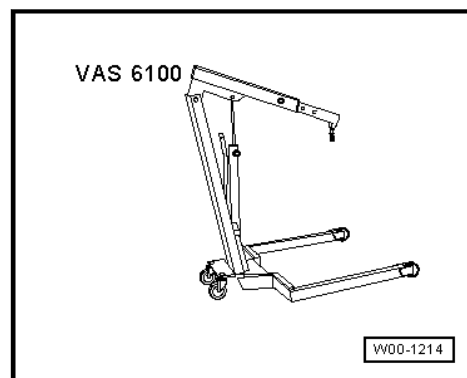


- ◆ Torque Wrench 1331 5-50Nm -VAG1331-

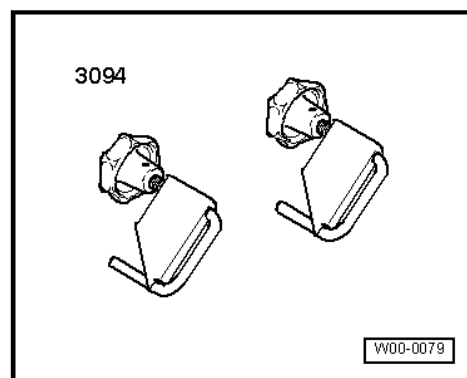




- ◆ Shop Crane -VAS6100-



- ◆ High-Voltage Battery Charger -VAS6565- with Jetta Charge Cable -VAS6565/2-
- ◆ Hose Clamps - Up To 25mm -3094-



Cautions & Warnings

Please read these WARNINGS and CAUTIONS before proceeding with maintenance and repair work. You must answer that you have read and you understand these WARNINGS and CAUTIONS before you will be allowed to view this information.

- If you lack the skills, tools and equipment, or a suitable workshop for any procedure described in this manual, we suggest you leave such repairs to an authorized Volkswagen retailer or other qualified shop. We especially urge you to consult an authorized Volkswagen retailer before beginning repairs on any vehicle that may still be covered wholly or in part by any of the extensive warranties issued by Volkswagen.
- Disconnect the battery negative terminal (ground strap) whenever you work on the fuel system or the electrical system. Do not smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher handy.
- Volkswagen is constantly improving its vehicles and sometimes these changes, both in parts and specifications, are made applicable to earlier models. Therefore, part numbers listed in this manual are for reference only. Always check with your authorized Volkswagen retailer parts department for the latest information.
- Any time the battery has been disconnected on an automatic transmission vehicle, it will be necessary to reestablish Transmission Control Module (TCM) basic settings using the Volkswagen Factory Approved Scan Tool (ST).
- Never work under a lifted vehicle unless it is solidly supported on stands designed for the purpose. Do not support a vehicle on cinder blocks, hollow tiles or other props that may crumble under continuous load. Never work under a vehicle that is supported solely by a jack. Never work under the vehicle while the engine is running.
- For vehicles equipped with an anti-theft radio, be sure of the correct radio activation code before disconnecting the battery or removing the radio. If the wrong code is entered when the power is restored, the radio may lock up and become inoperable, even if the correct code is used in a later attempt.
- If you are going to work under a vehicle on the ground, make sure that the ground is level. Block the wheels to keep the vehicle from rolling. Disconnect the battery negative terminal (ground strap) to prevent others from starting the vehicle while you are under it
- Do not attempt to work on your vehicle if you do not feel well. You increase the danger of injury to yourself and others if you are tired, upset or have taken medicine or any other substances that may impair you or keep you from being fully alert.
- Never run the engine unless the work area is well ventilated. Carbon monoxide (CO) kills.
- Always observe good workshop practices. Wear goggles when you operate machine tools or work with acid. Wear goggles, gloves and other protective clothing whenever the job requires working with harmful substances.
- Tie long hair behind your head. Do not wear a necktie, a scarf, loose clothing, or a necklace when you work near machine tools or running engines. If your hair, clothing, or jewelry were to get caught in the machinery, severe injury could result.
- Do not re-use any fasteners that are worn or deformed in normal use. Some fasteners are designed to be used only once and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual - replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.

Cautions & Warnings

- Illuminate the work area adequately but safely. Use a portable safety light for working inside or under the vehicle. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.
- Friction materials such as brake pads and clutch discs may contain asbestos fibers. Do not create dust by grinding, sanding, or by cleaning with compressed air. Avoid breathing asbestos fibers and asbestos dust. Breathing asbestos can cause serious diseases such as asbestosis or cancer, and may result in death.
- Finger rings should be removed so that they cannot cause electrical shorts, get caught in running machinery, or be crushed by heavy parts.
- Before starting a job, make certain that you have all the necessary tools and parts on hand. Read all the instructions thoroughly; do not attempt shortcuts. Use tools that are appropriate to the work and use only replacement parts meeting Volkswagen specifications. Makeshift tools, parts and procedures will not make good repairs.
- Catch draining fuel, oil or brake fluid in suitable containers. Do not use empty food or beverage containers that might mislead someone into drinking from them. Store flammable fluids away from fire hazards. Wipe up spills at once, but do not store the oily rags, which can ignite and burn spontaneously.
- Use pneumatic and electric tools only to loosen threaded parts and fasteners. Never use these tools to tighten fasteners, especially on light alloy parts. Always use a torque wrench to tighten fasteners to the tightening torque listed.
- Keep sparks, lighted matches, and open flame away from the top of the battery. If escaping hydrogen gas is ignited, it will ignite gas trapped in the cells and cause the battery to explode.
- Be mindful of the environment and ecology. Before you drain the crankcase, find out the proper way to dispose of the oil. Do not pour oil onto the ground, down a drain, or into a stream, pond, or lake. Consult local ordinances that govern the disposal of wastes.
- The air-conditioning (A/C) system is filled with a chemical refrigerant that is hazardous. The A/C system should be serviced only by trained automotive service technicians using approved refrigerant recovery/recycling equipment, trained in related safety precautions, and familiar with regulations governing the discharging and disposal of automotive chemical refrigerants.
- Before doing any electrical welding on vehicles equipped with anti-lock brakes (ABS), disconnect the battery negative terminal (ground strap) and the ABS control module connector.
- Do not expose any part of the A/C system to high temperatures such as open flame. Excessive heat will increase system pressure and may cause the system to burst.
- When boost-charging the battery, first remove the fuses for the Engine Control Module (ECM), the Transmission Control Module (TCM), the ABS control module, and the trip computer. In cases where one or more of these components is not separately fused, disconnect the control module connector(s).
- Some of the vehicles covered by this manual are equipped with a supplemental restraint system (SRS), that automatically deploys an airbag in the event of a frontal impact. The airbag is operated by an explosive device. Handled improperly or without adequate safeguards, it can be accidentally activated and cause serious personal injury. To guard against personal injury or airbag system failure, only trained Volkswagen Service technicians should test, disassemble or service the airbag system.

Cautions & Warnings

- Do not quick-charge the battery (for boost starting) for longer than one minute, and do not exceed 16.5 volts at the battery with the boosting cables attached. Wait at least one minute before boosting the battery a second time.
- Never use a test light to conduct electrical tests of the airbag system. The system must only be tested by trained Volkswagen Service technicians using the Volkswagen Factory Approved Scan Tool (ST) or an approved equivalent. The airbag unit must never be electrically tested while it is not installed in the vehicle.
- Some aerosol tire inflators are highly flammable. Be extremely cautious when repairing a tire that may have been inflated using an aerosol tire inflator. Keep sparks, open flame or other sources of ignition away from the tire repair area. Inflate and deflate the tire at least four times before breaking the bead from the rim. Completely remove the tire from the rim before attempting any repair.
- When driving or riding in an airbag-equipped vehicle, never hold test equipment in your hands or lap while the vehicle is in motion. Objects between you and the airbag can increase the risk of injury in an accident.

I have read and I understand these Cautions and Warnings.